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Vicious Circles  
in  
Disease.



J. B. HURRY.

Presented

by

Jamieson W. Hurrey.



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The Author

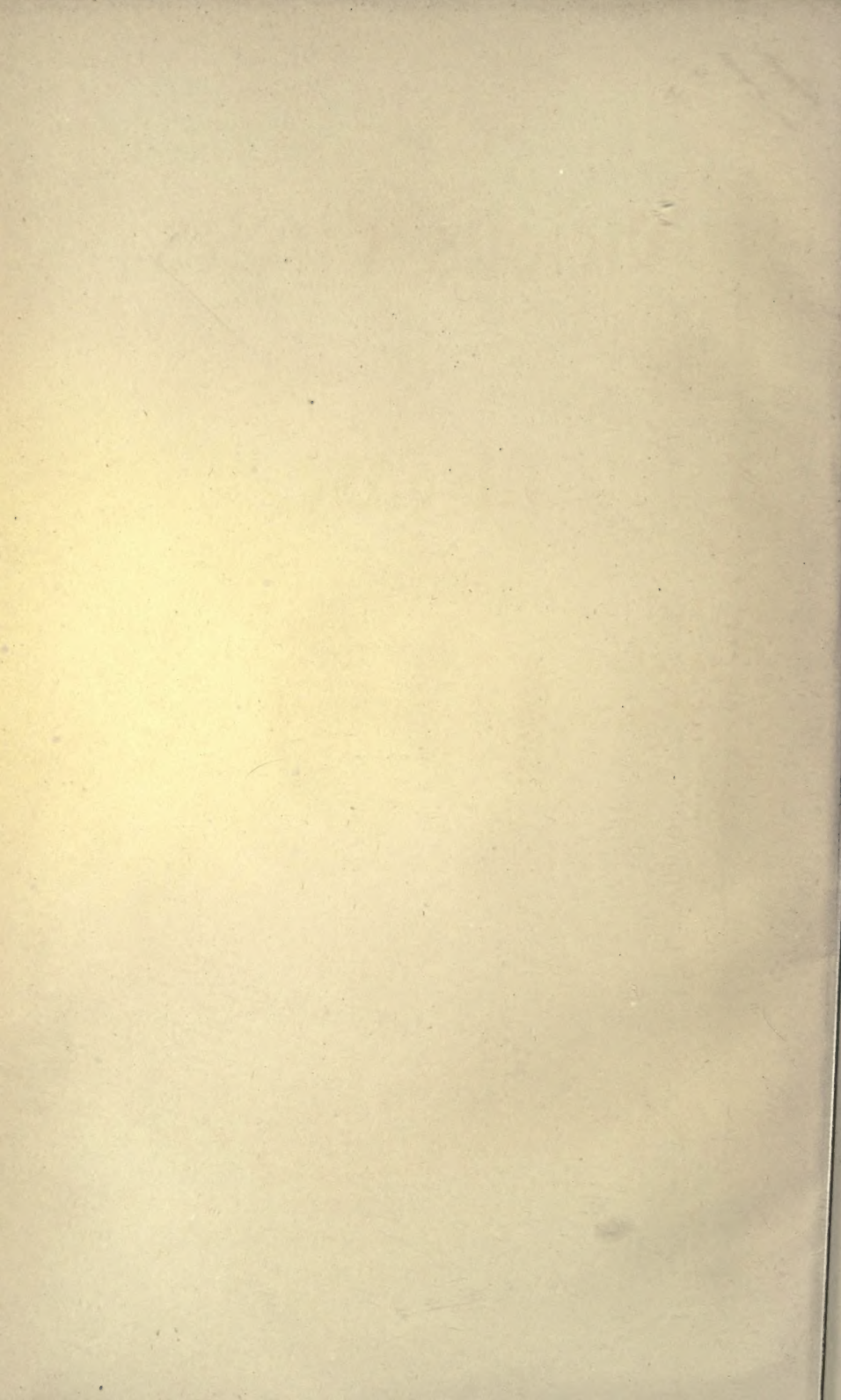




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# Vicious Circles in Disease.

BY

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Ex-President, Reading Pathological Society.

With Illustrations.



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## Preface.



HIS MONOGRAPH represents the first attempt to deal systematically with Vicious Circles in Disease, and is offered to the Profession with a full consciousness of many shortcomings.

Such an exploration into a new field of pathological enquiry needs no small circumspection. But care has been taken to quote freely from recognised authorities so that the reader will have before him the evidence for the propositions advanced.

The array of Vicious Circles brought together appears so overwhelming in its cumulative weight as to justify the conclusion that such Circles play a rôle of great importance in pathology. If this view is correct, the subject is one which no practitioner of the *Ars Medendi* can afford to neglect. Its study will conduce to increased accuracy of diagnosis, prognosis and treatment. Especially in regard to treatment will there be gain, for full of truth is the old maxim : *Qui bene diagnoscit bene medebitur.*

Most of the Chapters have appeared in the columns of the *British Medical Journal*, *The Lancet*, *The Practitioner* and the *Medical Press*, and I am indebted to the courtesy of the respective Editors for permission to reprint. My thanks are also due to many friends for assistance and encouragement.

My friend Dr. Harry Campbell has kindly read through the proof-sheets.

J. B. H.

WESTFIELD, READING.

*February 1st, 1911.*





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Συμπαθέα πάντα· κατὰ μὲν οὐλομελίην πάντα,  
κάτα μέρος δὲ τὰ ἐν ἐκάστῳ μέρει μέρεα πρὸς  
τὸ ἔργον.

*Hippocrates.*

## Introduction.

---



Y Vicious Circle (Circulus Vitiosus, Cercle Vicieux, Zirkelschluss) is meant a morbid process in which two or more disorders are so correlated that they act and react reciprocally on each other. The condition is therefore a self-aggravating and self-perpetuating one, until the Circle can be broken.

Although Vicious Circles are exceedingly common, they have received but scanty attention. No Medical lexicon has attempted a definition ; no text-book of Medicine discusses their pernicious influence on the course of disease. And yet it is no exaggeration to assert that the establishment of a Circle has much to do with the duration and termination of an illness. In the presence of this complication chronic disease becomes more chronic and acute disease more acute, while the territory over which morbid processes play havoc is apt to be indefinitely enlarged.

It is interesting to note how frequently Vicious Circles arise from a failure of those protective mechanisms by means of which the body resists disease and repairs injury. These beneficent provisions of Nature are often limited in their scope and blind in their action. They may, indeed, be so perverted as to aggravate, in lieu of relieving, the primary disorder. When such is the case, the *beneficent* becomes a *maleficent* influence ; the *Vis*

*Medicatrix* becomes the *Vis Devastatrix Naturæ*. A Vicious Circle is established.

The object of these pages therefore is to study conditions in which Nature's attempt to cure reflects small credit on her provisions, and the study will be found full of suggestion and guidance for all whose labours lie in the field of Medicine. Breadth of insight and a philosophic appraisalment of all the factors concerned in pathological processes are prizes well worth the winning.

The scheme adopted in the following pages is in the first place to consider the natural orders, so to speak, into which Vicious Circles may be grouped, some examples of each being given.

The great systems of the body are then taken one by one, in order that attention may be drawn to various diseases which are liable to be complicated by Circles. Numerous bibliographical references to original authorities are introduced.

The necessity of "Breaking the Circle" before recovery can take place is then next emphasised, instances being given to shew how Circles may be broken both by natural and by artificial means.

Diagrammatic illustrations are so helpful in giving precision to ideas that it has been thought well to make room for a considerable number. Especially may they be commended to teachers :

*Segnius irritant animos demissa per aurem  
Quam quæ sunt oculis subjecta fidelibus.*



## Chapter One.



### The Classification of Circles.



ICIOUS CIRCLES may be divided into the following generic Groups :

- Group I. Organic Circles.
- Group II. Mechanical Circles.
- Group III. Infective Circles.
- Group IV. Neurotic Circles.
- Group V. Chemical Circles.
- Group VI. Circles due to imperfect Repair.
- Group VII. Artificial Circles.

#### GROUP I.—ORGANIC CIRCLES.

To this Group belong Circles formed between organs that are so interdependent that when one of them is attacked by disease, and consequently in difficulties, the other or others are affected in turn, and aggravate the disorder of the first.

**Bronchitis.** An example of such a Circle is frequently met with in acute suffocative bronchitis, the bronchi and the heart being reciprocally involved.

Owing to the impeded pulmonary circulation unusual strain is thrown on the right ventricle, which in ingravescent attacks is liable to dilatation and failure. The weakened myocardium further retards the circulation, and thus aggravates the bronchitis and hinders the adequate oxygenation of the blood. Thus bronchi and heart reciprocally embarrass each other, and, in the words of West, "the Vicious Circle thus established explains the rapid failure of the heart, which is so striking a feature in the later stage of many cases of bronchitis."<sup>1</sup>

**Heart Disease.** Lauder Brunton draws attention to a Circle present in many cases of cardiac disease, where the heart and the viscera act injuriously on each other :

"The disordered circulation disturbs the functions of other organs, and these in turn make the circulation worse. . . . The disordered circulation interferes with the functions of the lungs, liver, stomach, intestines and kidneys. On account of the difficulty of breathing, exercise becomes impossible, and thus all the accessory aids to circulation given by the muscles and fasciæ during movement are done away with. Appetite becomes lessened and flatulence increases ; the elimination of waste products by the kidneys is interfered with, and distention of the abdomen, either by flatulence alone, or by flatulence with ascites, presses the diaphragm up, encroaches upon the breathing space in the lungs, and tilts the heart up, thus still further increasing its difficulties."<sup>2</sup>

**Nephritis.** As a third example may be mentioned a toxic condition in which the kidneys

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<sup>1</sup> Diseases of the Organs of Respiration, Vol. I., pp. 128-130.

<sup>2</sup> Therapeutics of the Circulation, p. 129.

and the blood are correlated and which is often the harbinger of death. A good description is given by Adami :

“ Functional inadequacy of the kidneys is not without its effect upon the composition of the blood. The quantity of water eliminated may deviate considerably from the normal, and waste products may be retained instead of excreted. The quality of the blood is thus depreciated, and, being laden with toxic substances, it in turn exerts an irritating and deteriorating effect upon the kidneys. In this way a Vicious Circle is set up, as a result of which the condition of the patient goes rapidly from bad to worse.”<sup>1</sup>

### GROUP II.—MECHANICAL CIRCLES.

Mechanical Circles are formed when abnormal pressure or tension relations act reciprocally on each other.

**Retroversion of Gravid Uterus.** An example is met with in obstetrics when a retroverted gravid uterus is so impacted in the pelvis as to press on the urethra and cause retention of urine. The distended bladder increases the retroversion ; the retroversion increases the retention.

**Strangulation of Intestine.** Such a Circle is sometimes established when a noose of intestine is strangulated. The lumen becomes distended with blood and gas, and the tension so exerted draws into the ring further intestine and mesentery which in their turn are strangled and distended.

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<sup>1</sup> Principles of Pathology, Vol. II., p. 735.



**Glaucoma.** In glaucoma the increased accumulation of intra-ocular fluid does not, as in a healthy eye, find relief by increased excretion, but on the contrary leads to further blocking of the anterior chamber and so aggravates the accumulation. In other words the increased pressure perpetuates itself to the grave detriment of vision.

### GROUP III.—INFECTIVE CIRCLES.

**Oxyurides.** A familiar illustration of an infective Circle is supplied by children suffering from oxyurides. The irritation and consequent scratching lead to portions of the helminths and to their eggs being caught under the nails, conveyed to the mouth, and swallowed by the host. Thence the ova pass into the intestines and rapidly attain sexual maturity. In this way the irritation ensures, by auto-infection, successive generations of the parasite.

**Scabies.** Scratching also forms a link in the Circle associated with scabies, since, according to Hebra,<sup>1</sup> the acarus may be conveyed from one part of the body to another by means of the finger-nails.

**Ankylostomiasis.** Ankylostomiasis may secure successive generations of the parasite by the habit of geophagy it so commonly excites. The habit may develop into a passion which even

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<sup>1</sup> Diseases of the Skin (N.S.S.), Vol. II., p. 227.

punishment will not check, and the fellaheen of Egypt unconsciously do their best to encourage their entozoa by their addiction to the Nile mud. Thus the earth hunger is both cause and effect of the ankylostomiasis.

## GROUP IV.—NEUROTIC CIRCLES.

**Neurasthenia.** Neurasthenia presents many examples of neurotic Circles. In fact any of the manifestations of the disease may be so complicated, whether the vascular, the digestive, the renal, the sexual or other systems are involved.

Dubois thus describes the correlations so common in the *malade imaginaire* :

“ In hysteria, as in neurasthenia, one must take into account the real fatigue of the nervous centres which, on the one hand, results directly from morbid states of mind, and, on the other, furnishes new food for auto-suggestions. Here we have the eternal Vicious Circle in which the neuroses travel. Their real ills give birth to their fears and their phobias, and, on the other hand, their mental representations of a pessimistic nature create new disorders.”<sup>1</sup>

**Habit Circles.** Habit Circles due to exaggerated reflex irritability of the nervous system form a subsection of this Group. Thus excessive and prolonged coughing may so irritate and exhaust the medullary centre as to pervert the reflex mechanism. The cough becomes uncontrollable and persists even though the local irritation has ceased.

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<sup>1</sup> Psychic Treatment of Nervous Disorders, tr. by Jelliffe and White, p. 180.

Other neurotic Circles are associated with the use of morphia, tobacco and various drugs, and will be described amongst other artificial Circles in Chapter IX.

#### GROUP V.—CHEMICAL CIRCLES.

**Goitre.** A chemical Circle due to the excess of CO<sub>2</sub> is met with when obstruction of the trachea is caused by hypertrophy of the thyroid. Under such conditions there is a liability to attacks of dyspnœa which provoke contraction of the respiratory muscles and thus lead to further obstruction and further increase of CO<sub>2</sub>.

**Anæmia.** Anæmia furnishes another illustration of a similar Circle, since, as Buchanan has pointed out, the impoverished state of the blood tends to perpetuate itself :

“The very causes which produce anæmia by perverted digestion or assimilation are intensified by the anæmia itself, so that a Vicious Circle is determined which tends to prolong and aggravate the condition. . . . In reference to blood loss or drain, hæmorrhage as a cause is self-evident ; it is rapidly recovered from when sudden and profuse within limits ; but continued and intermittent and small hæmorrhages from the mucous surfaces may produce an anæmic state, which may, from lack of recuperative power of the hæmogenetic tissues, become “progressive” and fatal. It is quite conceivable that here, also, a Vicious Circle is established, so that the impoverished state of the blood itself increases the tendency to hæmorrhage, which originally produced it.”<sup>1</sup>

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<sup>1</sup>The Blood in Health and Disease, p. 164.



## GROUP VI.—CIRCLES DUE TO IMPERFECT REPAIR.

**Imperfect Repair.** Mitchell Bruce has drawn attention to Vicious Circles set up by various diseases in which recovery is incomplete. There is *no restitutio ad integrum*:

“ The patient does not die, but he remains permanently damaged, disabled, delicate, and possibly in distress. Such is the termination of a proportion of cases of cerebral hæmorrhage (hemiplegia), and acute endocarditis (valvular disease of the heart). A part of the brain, a valve of the heart, is permanently damaged ; the man is healthy but not sound. . . . The incompleteness of recovery is shown by a disposition to relapse, as in perityphlitis and gastric ulcer, by diminished resistance to the causes of fresh disease. . . . In this way, amongst others, a Vicious Circle forms and widens.”<sup>1</sup>

As other illustrations may be mentioned iritis, pericarditis, pleurisy, appendicitis.

## GROUP VII.—ARTIFICIAL CIRCLES.

In this Group may be placed such Circles as do not arise in the natural course of disease but have an artificial origin. Many such are dependent on social customs ; for others alas ! injudicious treatment has been responsible.

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<sup>1</sup> Principles of Treatment, p. 158.

**Injudicious Treatment.** Let us hope that such atrocities as will be referred to in Chapter IX. will soon lose all but a historical interest, and that the day will dawn when the practitioner of Medicine will merit the eulogium pronounced upon him by Hippocrates :

Ἰατρός γὰρ φιλόσοφος ἰσότητος.



## Chapter Two.

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### Circles associated with the Nervous System.



THE central nervous system (Fig. I.) is the capital of the human microcosm with whose remotest outposts it is, for good as well as for ill, in constant communication. In health the closest correlations and polarities exist between it and every other organ ; in disease such correlations and polarities are no less intimate.

It would be futile to attempt an enumeration of the reciprocal interdependencies met with in disorders of the nervous system ; fresh illustrations are being continually revealed by the progress of research. But it will be useful to draw attention to a few striking examples, which every practitioner will be able to supplement from his own experience.

For the sake of clearness we shall deal in order with :

- I. Circles associated with Functional Disorders.
- II. Circles associated with Organic Disease.



## I.—CIRCLES ASSOCIATED WITH FUNCTIONAL DISORDERS.

### (a) Neurasthenia.

**Neurasthenia.** Perhaps the commonest and most protean of functional disorders is neurasthenia. "In no complaint does it happen more frequently that the patient gets into a Vicious Circle, the fundamental disorder producing symptoms which again maintain and aggravate the disease."<sup>1</sup> Owing to the infinite variety of its manifestations the disease has been described as *non morbus, sed morborum cohors*, and in truth there is scarcely an organ that may not at one time or another be affected. Any of the local disorders may be complicated by a Circle, whether the mental or psychic faculties or the digestive, vascular, sexual or other systems are involved.

**Insomnia.** A familiar example is met with in insomnia, a most obstinate disorder in the neurasthenic, and one which so disturbs the nerve centres as to aggravate the primary trouble. Indeed Clifford Allbutt describes insomnia as "generally one of the links of the Vicious Circle in which the victim is enchained."<sup>2</sup>

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<sup>1</sup> Ballet, Neurasthenia. Introduction by Campbell Smith, p. 25.

<sup>2</sup> Allbutt and Rolleston, System of Medicine, Vol. VIII., p. 750.

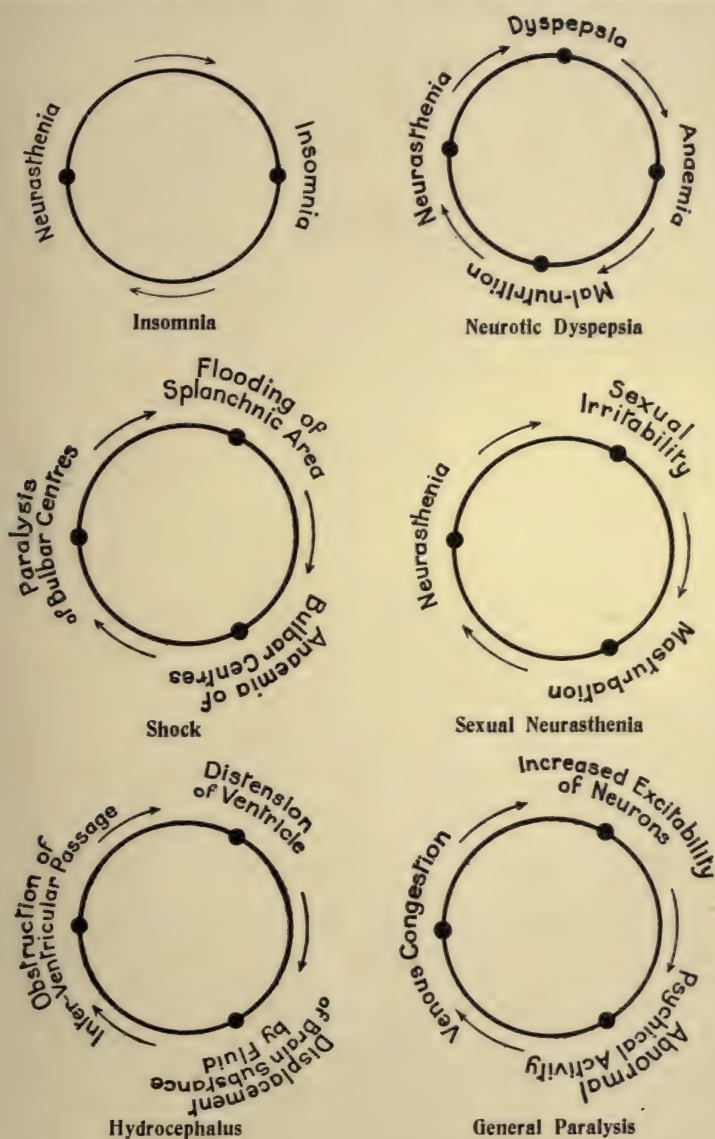


Fig. 1. Circles associated with the Nervous System.

**Pain.** The presence of pain often constitutes a complication, as pointed out by Herman :

“ The great causes of neurasthenia are conditions which (a) cause continuous pain and (b) prevent sleep. The two things often form a Vicious Circle. A small local cause disturbs sleep, and want of sleep makes the nervous system over-sensitive. In proportion as the neurasthenic symptoms have coincided in time with the development of local pain, so surely may we conclude that the removal of the local pain and the procuring of sound sleep will cure the neurasthenia.”<sup>1</sup>

**Mental Depression.** Mental depression and malnutrition often accompany the insomnia, each factor reacting on the other :

“ The mental depression reacts on nutrition, sleep and the other vital functions, and thus creates a grievous *Circulus Vitiosus* which aggravates the primary disorder. Various other neurotic and psychical phenomena, which can scarcely be called neurasthenic, may also sooner or later shew themselves.”<sup>2</sup>

That the power of the mind over disease was well known to the Greeks is shown by a quotation from Euripides :

Ἀνταὶ γὰρ ἀνθρώποισι τίκτουσιν νόσους.<sup>3</sup>

and Shakespeare also describes the condition :

“ Sorrow’s weight doth heavier grow  
Though debt that bankrupt sleep doth sorrow owe.”

<sup>1</sup> *British Med. J.*, 1910, Vol. I., p. 183.

<sup>2</sup> Müller, *Handbuch der Neurasthenie*, p. 61.

<sup>3</sup> *Fragments*, No. 896.



**Malnutrition.** Even apart from insomnia melancholy often causes malnutrition, which in turn reacts on the mind. In Rayner's words :

"In diseased conditions, especially in the depressed emotional states, this interaction of the mind on the body and of the bodily state on the brain establishes a Vicious Cycle of nutritional disorder, which tends to increase and prolong the disease."<sup>1</sup>

**Shock.** Sometimes a sudden shock may be the *fons et origo mali*, inducing a traumatic neurasthenia such as has been described by Treves :

"The patient is irritable and ill-tempered, suffers from palpitation, and cannot bear the least disturbance or noise ; mental occupation increases the discomfort in the head, he cannot concentrate his thoughts upon anything—himself excepted—for any length of time, and he complains, therefore, that he has lost his memory. Sight seems to fail him, because the effort of ciliary accommodation is soon followed by fatigue ; he loses flesh and looks wasted, anxious and ill. Depression is the main and most prominent feature in this general state of malaise, and depression and despondency of mind are common. A Vicious Circle is soon established, in which loss of healthy nervous tone, both in the conscious life of the individual and in the unconscious and insentient working of the various inorganic processes of the animal economy, leads to serious derangement of function in the various parts of the system."<sup>2</sup>

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<sup>1</sup> Allbutt and Rolleston, System of Medicine, Vol. VIII., p. 965. Dr. Rayner and other writers use the expression "Vicious Cycle" in place of "Vicious Circle." The latter seems preferable since it better conveys the idea of continuity, instead of that of recurrence.

<sup>2</sup> System of Surgery, Vol. II., p. 258.

Not only may the happiness and usefulness of a life be ruined under such circumstances, but the Circle oftens widens so as to include a mother, sister, or other relative of the sufferer, especially if the latter is of the female sex.

"Nothing is more curious," writes Weir Mitchell, "nothing more sad and pitiful than these partnerships between the sick and selfish and the sound and over-loving. By slow but sure degrees the healthy life is absorbed by the sick life, in a manner more or less injurious to both, until, sometimes too late for remedy, the growth of the evil is seen by others. . . . A hysterical girl is (as Wendell Holmes has said) a vampire who sucks the blood of the healthy people about her."<sup>1</sup>

**Auto-suggestion.** In many cases of neurasthenia in which some peripheral organs are reciprocally involved with the central nervous system, the sufferer, by fixing his consciousness with morbid intentness on his organs, creates not merely unhealthy sensations but also functional disorders, e.g. palpitation, flatulence, polyuria and nausea. It is, indeed, difficult to assign the limits to auto-suggestion, so far-reaching and imposing may be the resulting disturbance.

As Jelliffe puts it :

"The mind plays an important part in *exaggerating* symptoms which have a slight physical basis, such as a vascular derangement of a part.

The mind also plays an important part in the *perpetuation* of symptoms after the physical basis which had initiated them has passed away."<sup>2</sup>

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<sup>1</sup> Fat and Blood, pp. 40, 49.

<sup>2</sup> Osler and Macrae, System of Medicine, Vol. VII., p. 822.

**Anæmia.** Numerous examples of correlations in which the cardio-vascular, the digestive, the sexual and other systems are involved, will be found in subsequent Chapters and need not be repeated here. But an exception may be made in the case of anæmia, owing to its far-reaching secondary effects on nutrition.

Löwenfeld thus describes the Circle :

“ In neurasthenic persons the anæmia is not so much the cause, as the result of the nervous condition. For this latter affects both appetite and digestion and so leads to malnutrition. A Circulus Vitiosus is now established, since the malnutrition perpetuates and intensifies the nervous exhaustion and so contributes to the nervous dyspepsia. All the resources of therapeutics will be required if this Circulus Vitiosus is to be broken.”<sup>1</sup>

**Hysteria.** The vascular, digestive and sexual Circles associated with neurasthenia apply *mutatis mutandis* to the allied disorder hysteria.

## (b) Other Functional Disorders.

**Over-Work.** Apart from neurasthenia various conditions are met with in which cause and effect bear reciprocal relations to each other. Over-work, for example, produces headache and insomnia, which react on each other and perpetuate the primary condition. Again, sickness in a nursing mother may so upset the equanimity of the nursing mother as to injure her supply of milk. This in turn causes illness in the infant and so further injures the health of the mother.

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<sup>1</sup> Neurasthenie und Hysterie, p. 79.



**Post-operative Shock.** An important Circle may be established in cases of post-operative or other forms of shock, due to exhaustion of the vaso-motor centres. During health, the activity of those centres is increased or diminished, according as arterial pressure falls or rises, the cerebral circulation being maintained by this compensatory mechanism. But when these centres are paralysed, exhausted or inhibited, the vaso-motor mechanism is thrown out of gear, and a diminished blood supply weakens, instead of stimulating, the centre.

In severe shock the vaso-motor centres are paralysed, and the blood pressure falls, partially emptying the intrinsic cardiac and cerebral vessels. Less blood is pumped up to the brain, and the bulbar centres are still further weakened. Thus cause and effect act and react on each other, leading, when the shock is severe, to disastrous consequences.<sup>1</sup> A similar condition occasionally accompanies the administration of chloroform, which not only acts on the bulbar centres, but also causes dilatation of the heart, and further interferes with the compensatory mechanism. Probably syncope and church faints are due to a like interference with the vaso-motor system.

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<sup>1</sup> Crile, *British Med. J.*, 1910, Vol. II., p. 759 ; *Practitioner*, 1910, Vol. II., p. 169.

**Migraine.** According to some neurologists migraine is dependent on increased pressure in the ventricles of the brain, associated, in the view of Spitzner, with stenosis of the foramen of Monro:

“The occasional causing of a passive or active hyperæmia of the brain leads to a hyperæmia of the choroid plexus. This causes a more or less complete plugging of the foramen of Monro, with the production of an increase of pressure in one or both of the ventricles. The increased pressure on the vessels causes more distention and more pressure on the walls of the ventricles; a Vicious Cycle is established, and the migraine mounts to its height, until the pressure is relieved either by a spontaneous reduction or by the sudden let down in tension due to a shock reaction—such as occurs in the act of vomiting, from the use of various vaso-dilators, etc.”<sup>1</sup>

Adami, on the other hand, suggests a different explanation of the paradoxical contraction of arteries under heightened internal pressure, which establishes the Vicious Circle:

“The higher the blood pressure, the greater becomes the contraction of the arterioles; the less, therefore, the blood supply to the tissues and the greater the call upon the central nervous system for more blood. Whether from reflex stimulation of the heart to increased activity in order to supply the tissues, or from direct automatic action of the increased aortic pressure in raising the intraventricular pressure, and so stimulating the ventricles to more forcible contraction, the blood pressure becomes yet higher, and, as a result, the arteries still further contracted. It is along these lines that we would explain the progressive rise of blood pressure and contraction of the smaller arteries in migraine.”<sup>2</sup>

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<sup>1</sup> Osler and Macrae, *System of Medicine*, Vol. VII., p. 752; Spitzner, *Ueber Migraine*, p. 76.

<sup>2</sup> Adami, *Principles of Pathology*, Vol. II., p. 175.

**Malnutrition.** Many other illustrations of disordered correlations are met with. Thus defective nutrition dependent on visceral disorder impairs the nutrition of the nerve centres, and thus leads back to disorders of the viscera controlled by those centres. Especially are these morbid correlations troublesome, if the nutritive qualities of the blood are deteriorated as in anæmia. The resulting disturbance of the nervous system reacts on all the viscera. Even the lungs come in time to be involved, and "the patient lies in the Vicious Circle of a reduced activity of the respiratory centre, due to the anæmia it should help to dispel."

**Habit Circles.** Habit Circles form a group of some interest, and arise from the progressive proclivity to neurosal paroxysms which may be acquired through mere recurrence. Excessive and prolonged coughing, for example, may so irritate and exhaust the medullary centre as to pervert the reflex mechanism. The cough becomes uncontrollable, and persists even though the local irritation has ceased. Similar conditions accompany attacks of persistent vomiting and diarrhœa, and were attributed by Hunter to "the memory of the body."

As additional illustrations may be mentioned the reciprocation between stuttering and nervousness, between flushing and self-consciousness; also habit spasms of many descriptions. Vices of all kinds beget a craving and lead to indulgence.



Epilepsy is associated with another variety of Circle, inasmuch as every attack increases the labile condition of the nerve centres and facilitates recurrence. In fact, recurrence is largely the result of the previous attack, culminating at times in the status epilepticus.

## II.—ORGANIC DISEASE OF THE NERVOUS SYSTEM.

**Cerebral Compression.** Leonard Hill draws attention to a Vicious Circle which is established when intra-cranial hæmorrhage causes increased cerebral compression, and thus leads to a secondary increase of compression by the obliteration of the veins and capillaries in the affected area and a consequent congestive œdema. He says :

“ The high blood pressure which exists in those capillary areas surrounding the seat of complete vascular obliteration will lead to increased transudation of fluid, since plasma may pass more easily into the brain substance than the blood through the compressed capillaries. The transudation will take place at almost arterial tension, will increase the volume of the foreign body, and so will lead to compression of other capillary areas. A Circulus Vitiosus is thus established and the cerebral anæmia may spread indefinitely.”<sup>1</sup>

**And again :**

“ In meningitis, tubercular meningitis and cerebral abscess, compression can arise by the accumulation of inflammatory exudations, by inflammatory dilatation, by thrombosis and blocking of vascular areas ; and whenever the Sylvian aqueduct and the veins of Galen are obliterated by intraventricular transudation. In all these pathological states a Circulus Vitiosus can be established leading to advancing cerebral anæmia. The pathological cause of ventricular hydrocephalus is no doubt to be found in blocking of the veins of Galen and the Sylvian aqueduct.”<sup>2</sup>

<sup>1</sup> Physiology and Pathology of the Cerebral Circulation, p. 188.

<sup>2</sup> L.c., pp. 197, 200.

**Hydrocephalus.** Another form of Circle may be established in cases of hydrocephalus where the ventricles are dilated with fluid owing to some obstruction in the communicating channels. The dilated ventricles may so displace the adjacent parts as to press on and increase the obstruction to which the accumulation of fluid was primarily due. For example, the cerebellum and medulla may be pressed down into the foramen magnum so as to plug that aperture. Such plugging in turn increases the distension of the ventricles and renders the condition a self-perpetuating one. Or the dilated ventricles (by compressing the membranes of the nerve roots) may close the lymph paths or natural drainage channels, which closure in its turn aggravates the ventricular dilatation.

**Congestion.** Inflammatory conditions, where toxins dilate the blood-vessels, alter the metabolism of the tissues and raise the osmotic pressure (by increasing the crystalloidal cell-products), are often complicated by a Vicious Circle. The tissues swell at the expense of the blood-supply of neighbouring parts, where there is no vaso-dilatation or œdema. "The anæmia so produced may in its turn damage the tissue metabolism of these parts, and set up congestion and œdema therein, and thus a Vicious Circle may be established." <sup>1</sup>

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<sup>1</sup> Leonard Hill, *Further Advances in Physiology*, p. 139.

**Paralysis.** F. W. Mott draws attention to a Circle associated with psychical activity and venous stasis in many cases of general paralysis and tabes, probably due to the mechanical conditions favouring stasis in the frontal and central convolutions, and especially common where syphilis has lowered the durability of the nervous system. He thus describes the Circle :

“Psychical activity will cause hyperæmia and congestion of the brain, and in regions where there is a tendency to stasis the congestion may persist, especially if it leads to insomnia. A Vicious Circle becomes established by conditions which tend, on the one hand, to perpetual venous congestion in certain regions, and, on the other hand, to increased excitability of the neurons ; these factors mutually interact.”<sup>1</sup>

**Epilepsy.** The prolonged convulsions met with in the status epilepticus and in some cases of general paralysis may also establish reciprocal relations :

“The mechanical conditions are such as to produce a Vicious Circle terminating in progressively increased venosity of the blood in the cortex, especially of that portion supplied by the carotid arteries, the veins of which drain into the longitudinal sinus. In fact, a pure case free from complications and intercurrent affections, such as respiratory failure of considerable duration, asphyxia or some cardiac failure, or some secondary infection, is rarely to be obtained.”<sup>2</sup>

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<sup>1</sup> *Lancet*, 1900, Vol. II., pp. 81-3.

<sup>2</sup> Mott in Allbutt and Rolleston, *System of Medicine*, Vol. VII., p. 226.

**Hemiplegia.** Another Circle may be established in hemiplegia, owing to malnutrition of the neurons. During health the activity and nutrition of the neurons depend upon the regular maintenance of peripheral stimuli. Such stimuli are interfered with in hemiplegia, with the result that further degeneration of the neuron follows, leading in turn to greater helplessness and a still greater lack of afferent stimuli.<sup>1</sup>



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<sup>1</sup> Hutchinson and Collier, Index of Treatment, pp. 431-4.



## Chapter Three.

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### Circles associated with the Cardio-Vascular System.



OWING to the importance of the cardiovascular system in the animal economy, and to the complexity of the vital and mechanical phenomena presented by that system, the morbid correlations created by disease are of the highest interest (fig. II.).

The following Classification will be found convenient :

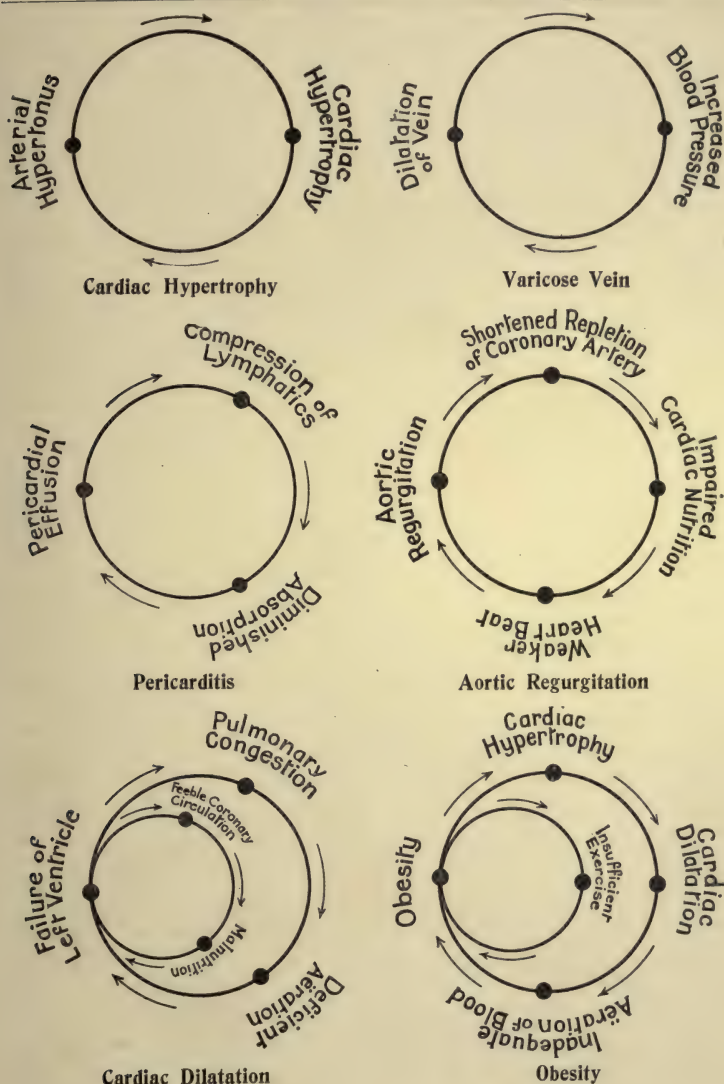
- I. Circles associated with the Myocardium.
- II. Circles associated with the Endocardium.
- III. Circles associated with the Pericardium.
- IV. Circles associated with Cardiac Neuroses.
- V. Circles associated with the Blood-vessels and Lymphatics.
- VI. Circles associated with the Blood.

### I.—CIRCLES ASSOCIATED WITH THE MYOCARDIUM.

**Pneumonia.** A striking example is sometimes presented by cardiac failure in croupous pneumonia, the heart and the lungs being the organs reciprocally involved. The cardiac failure often met with in this malady results partly from poisoning and exhaustion of the nerve centres, and partly from the unusual mechanical effort required to overcome the increased obstruction in the pulmonary circuit. In either case the failure of the heart reacts unfavourably on the lungs by further retarding the pulmonary circulation, which retardation throws an extra burden on the already overburdened myocardium, whose nutrition is impaired by, and whose contractile power is unequal to, the demands upon it. Thus heart and lungs embarrass each other, and the establishment of the Circle is frequently the harbinger of death.

A closely allied condition occurs in acute bronchitis.

**Arterial Hypertonus.** Heightened arterial pressure in the pulmonary and systemic circuits gives rise to several Circles. Thus in the case of the *right* side of the heart various diseases, such as chronic bronchitis and emphysema, obstruct the flow of blood through the lungs and lead to the hypertrophy and dilatation of the right ventricle. These changes are at first compensatory and salutary. But as time goes on, compensation fails, leading to congestion



**Fig. II. Circles associated with the Cardio-Vascular System.**

The two lower figures represent the double Circles which complicate cardiac dilatation and obesity.

of the venous system and to interference with the functions of digestion, absorption, elimination and sanguification. The unfortunate myocardium, already labouring under special difficulties *a fronte*, is poisoned by the products of metabolism, which sap its nutrition and intensify its weakness. A vast Circle is established in which the failing right ventricle and the great viscera act and react injuriously on each other.

Even commoner are the conditions which raise the arterial tension in the systemic circulation, and throw excessive work on the *left* side of the heart. Amongst them are renal disease, gout, lead poisoning and other conditions causing defective metabolism. The toxic products in the blood induce a hypertonic condition of the arterioles, which in turn requires a more forcible cardiac systole, so as to drive the blood through the distant ramifications of the vascular system. The consequent rise in blood pressure leads to hypertrophy of the left ventricle, which hypertrophy again reacts on and raises the pressure. Thus the antagonistic forces of arterial hypertonus and cardiac hypertrophy come into operation and complete the morbid Circle.<sup>1</sup>

**Cardiac Failure.** At a later period the degenerative processes of arterio-sclerosis frequently supervene, causing obliterative changes in the coronary

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<sup>1</sup> Oliver, *British Med. J.*, 1910, Vol. II., p. 1333.



arteries, and interfering with the nutrition of the myocardium. When this happens, a further Circle is established. The impaired nutrition causes a feeble systole and this in turn further weakens the coronary circulation. Dilatation of the left ventricle follows, ending in grave cardiac disorganisation :

“ The insufficiency . . . . . is due to the Vicious Cycle created by lowering the pressure in the coronary arteries, which occurs directly the ventricle is unable to maintain the required aortic pressure. Thus, at the very time when the heart muscle requires the greatest supply of nutrition, the supply of blood to the myocardium lessens.”<sup>1</sup>

Although the right and left sides of the heart are mainly associated with disease of the pulmonary or systemic areas respectively, the closest sympathy exists between the two sides, and they tend to suffer together in disease, although not to the same extent. One reason for this simultaneous disturbance may be found in the Circle which may be established between the two sides of the heart, owing to their anatomical structure, as has been pointed out by West.<sup>2</sup> When the right side of the heart fails, the whole system of coronary veins, which open into the right auricle, becomes engorged. Hence result impaired circulation through, and impaired nutrition of, the *whole* heart. As the left ventricle becomes implicated, its driving power is diminished, giving rise to pulmonary congestion and defective aëration of the blood ; the circulation through the coronary arteries also suffers,

<sup>1</sup> Osler and Macrae, System of Medicine, Vol. IV., p. 32.

<sup>2</sup> Diseases of the Organs of Respiration, pp. 129, 130, 237.

thus adding another source of general cardiac weakness. Thus it comes about that right-sided failure involves the left side, and left-sided failure involves the right, and unless the Circle can be broken, a fatal result is only too probable.

It is important to remember that the circulation through, and the nutrition of, the heart depend on the activity of this organ. The feebler the systole the poorer the nutrition; the poorer the nutrition the feebler the systole. Amongst the disorders that diminish the cardio-motive force, and bring this correlation into play are sudden strain, influenza, and other toxic agencies. Indeed in serious attacks "there is a Vicious Circle of conditions which precludes all hope of recovery."<sup>1</sup> Especially is this result probable when the blood supplied to the myocardium is laden with impurities, or when there is a progressive accumulation of residual blood leading to increasing dilatation of the ventricle. Then indeed does life hang by a thread which may snap at any moment.

**Arrhythmia.** Hirschfelder draws attention to a Circle associated with cardiac arrhythmia. For while the arrhythmia on the one hand increases the CO<sub>2</sub> in the blood and thus diminishes the tone of the cardiac muscle, the long pauses in turn increase the venous pressure and thus favour over-distention of the heart whose tone has been diminished. The

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<sup>1</sup> Osler and Macrae, *System of Medicine*, Vol. IV., p. 108; Cohnheim, *General Pathology* (N.S.S.), Vol. III., p. 1,416.





**Flatulence.** At other times a feeble myocardium leads to gastric congestion, fermentation of the ingesta, upward displacement of the diaphragm and further embarrassment of the heart. With all cardiac symptoms it is a good rule to examine the stomach, and to keep in remembrance the connection indicated by the expression "heart-wind."

**Ill-Health.** But Vicious Circles are not confined to the graver lesions of the myocardium. They often are present when temporary ill-health due to want of ventilation, dyspepsia or over-work leads to feeble action of the heart. For this in turn disturbs the functions of digestion and elimination, which disturbances again react on the myocardium, a reciprocal relationship being established between them.

## II.—CIRCLES ASSOCIATED WITH THE ENDOCARDIUM.

A beautiful example of the *Vis Medicatrix Naturæ* is presented by the compensatory changes which follow upon valvular lesions. But those changes generally prove inadequate as the years roll by. Decompensation follows and creates similar Circles to those that have been already described in connection with a failing myocardium.

There are, however, other Circles specifically associated with valvular lesions. In the words of



Bouillaud, "Diverses maladies du cœur peuvent elles-mêmes devenir causes déterminantes d'autres maladies de cet organe,"<sup>1</sup> and it is in connexion with these secondary disorders that reciprocal relations occur.

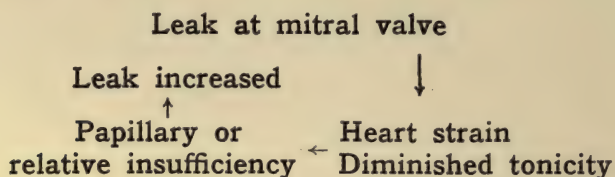
**Aortic Regurgitation.** For example in cases of aortic regurgitation the state of repletion of the coronary arteries lasts a shorter period than normal. Hence follow impaired nutrition of the myocardium, lessened working capacity, increased regurgitation, and consequently a still less adequate repletion of the coronaries, culminating occasionally in sudden death.

**Mitral Regurgitation.** Again, when mitral regurgitation is consequent on aortic regurgitation or obstruction (owing to progressive dilatation of the ventricle and auriculo-ventricular orifice), a morbid Circle arises through the reciprocal effect on one another of the aortic lesion and the mitral regurgitation.

Another Circle may be associated with mitral regurgitation, owing to the cusps of the valve not being brought tightly together, through a want of cardiac tone. The consequence is that a small leak is transformed into a serious one, leading to a further

<sup>1</sup> Huchard, *Maladies du Cœur et de l'Aorte*, Vol. III., p. 717.

diminution of cardiac tone. Hirschfelder uses the following diagram to represent the Circle : <sup>1</sup>



**Tricuspid Regurgitation.** Tricuspid regurgitation sometimes results from the dilatation of the right ventricle secondary to mitral disease. For a time the reflux may relieve the overloaded ventricle, but its ultimate effect is to render the ventricle less competent to overcome the obstruction, thus tending to increased dilatation.

**Septic Endocarditis.** In the case of septic endocarditis an infective Circle is frequently started by the micro-organisms circulating in the blood. These microbes lead to vegetations and erosions in the endocardium, especially that lining the valves, and these vegetations throw off showers of infective emboli carrying infection far and wide and leading to further endocardial lesions.

Another Circle is established when an attack of endocarditis bequeaths permanent valvular mischief. The patient does not die, but remains an invalid, the *sanatio incompleta* being shown by a disposition to

<sup>1</sup> Diseases of the Heart and Aorta, p. 328.

relapse, by a diminished power of resistance to fresh attack. "As a taper just blown out will snatch the flame from the torch that scarcely touches it" so readily is the endocardiac mischief rekindled. Thus the valvular mischief and the lowered resistance act and react on each other, often ending in extensive cumulative mischief.

**Congenital Heart Disease.** The Circles met with in congenital heart disease are most appropriately mentioned here, since they often arise from imperfections either of the valves or of the septa caused by foetal endocarditis.

Some forms of patent foramen ovale give rise to reciprocal disorders. So long as the patient leads a quiet life, enough blood may pass through the lungs to keep the blood aërated, while the remainder passes through the foramen ovale which offers less resistance. But as soon as active exercise is taken, a larger quantity passes direct into the left auricle and ventricle (owing to the pulmonary stenosis), and thus escapes oxygenation. The consequence is a rise in venous pressure which drives still more blood through the foramen ovale, "giving rise to the Vicious Circle of the open foramen ovale."<sup>1</sup>

In other forms of congenital morbus cordis the venous stasis caused by the cyanosis gives rise to

<sup>1</sup> Hirschfelder, Diseases of the Heart and Aorta, pp. 436, 447.



prolonged convulsions, and these two conditions aggravate each other and frequently involve a grave menace to life. A third Circle occurs in connection with the dilated and newly formed capillaries and the increase of connective tissue which have been noted both in the skin and internal organs, and Carpenter suggests that "the changes thus produced in the lungs may lead to the cyanosis by producing pulmonary obstruction. Certainly a Vicious Circle is created."<sup>1</sup>

**Physical Strain.** When valvular lesions occur in such persons as navvies or coalheavers, whose daily work involves severe muscular exertion, disastrous consequences generally follow much earlier than they would do were the environment more favourable to compensation. Many a life has been sacrificed where poverty or adverse fortune compelled a life of toil. The labour aggravates the heart lesion; the heart lesion (owing to associated dyspnoea and palpitation) makes the daily task relatively, if not absolutely, harder.

### III.—CIRCLES ASSOCIATED WITH THE PERICARDIUM.

**Pericarditis.** In many attacks of pericarditis there is no satisfactory *restitutio ad integrum*. The acute attack subsides, but leaves behind a liability

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<sup>1</sup> Osler and Macrae, System of Medicine, Vol. IV., p. 334.



to recrudescence ; the damaged pericardium on trivial exposure is attacked afresh, and each time the damage increases, until the pathological changes due to the several attacks may be enormous. The primary lesion has predisposed to the second attack ; the second attack has aggravated the primary lesion.

In pericarditis with effusion several Circles may occur. The mechanism by which a constant circulation of fluid into, and out of, the pericardial cavity is maintained during health is known as the lymphatic pump, worked by means of the cardiac and respiratory movements acting on the lymphatics and stomata.

In pericardial effusion, however, a fibrinous exudation may block the stomata, check the removal, and in this way cause an increase, of the effusion. Again the effusion may compress the stomata and superficial lymphatics and thus block the channels by which it should be absorbed. It also reduces the cardiac movements on which depends the efficiency of the pump, and compresses the great vessels at the roots of the lungs, heart and pericardium. The circulation is thus hampered, and the hampering increases the effusion.

**Hydro-Pericardium.** Hydro-Pericardium, due to venous stasis in the coronary veins or to some other cause, acts in a similar manner. The dropsy, often

part of a general condition, in its turn aggravates the disease from which it sprang. In the words of Gibson :

“Hydro-Pericardium may be said to step in as the closing link of a pathological chain, and once it has made its appearance it unites with the other morbid conditions to form a Vicious Circle of fatal import.”<sup>1</sup>

#### IV.—CIRCLES ASSOCIATED WITH NEUROSES.

“Weak Heart.” A lamentable Circle is sometimes set up when a practitioner erroneously diagnoses a “weak heart,” and excites in his patient an ever-present dread of serious illness or immediate death. The constant direction of the mind to the one organ leads to morbid consciousness of trivial sensations, to such an unwholesome *régime* as to induce a feeble and flabby heart, which at the slightest provocation reacts on the neurotic condition. The exaggerated fears, like Damocles’s sword, overshadow life, and render all enjoyment impossible.

An illustration is given by Sir Douglas Powell, who tells the story of a young married woman, formerly of active, energetic, useful habits, whose doctor had diagnosed a “weak heart.” She had been taking the utmost care of a healthy organ ever since, resting half the day, never even walking upstairs, until she became fat, breathless, anæmic and miserable. Many

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<sup>1</sup> Diseases of the Heart and Aorta, p. 386.

months would elapse before she could be weaned back to her former healthy activity, if indeed recovery were at all possible.<sup>1</sup>

**Angina Pectoris.** Huchard has drawn attention to a similar Circle which is established in connection with angina pectoris when an excessive degree of rest is prescribed. The over-rested heart grows more and more unequal to its task, and more and more irritable when extra demands are made upon it :

“ Les angineux tournent souvent dans un Cercle Vicieux morbide. Le repos leur est formellement prescrit ; on leur défend l'exercice . . . et à la faveur de ce repos systématique, de cette immobilité prolongée, ils ont une tendance à faire du tissu adipeux, à devenir obèses ; bientôt, la circulation intra-abdominale va se ralentir . . . . . et le cœur . . . . . va être bientôt insuffisant à la tâche. De la sorte, il y a des angineux qui se trouvent, à la longue, singulièrement aggravés par cet embarras circulatoire dû au manque d'exercice.”<sup>2</sup>

**Neurasthenia.** When a neurotic temperament is associated with real morbus cordis, another variety of Circle may be established, if the patient unduly “takes it to heart.” Hence the physician who realises how important is equanimity for the progress of compensation, and how the whole truth may rob his patient of the needful peace of mind, may well be in doubt how much he should reveal. In the words of Fraentzel : “ Das Wissen is oft viel schlimmer als die Krankheit selbst.”

<sup>1</sup> Treatment in Diseases and Disorders of the Heart, p. 15.

<sup>2</sup> Maladies du Cœur et de l'Aorte, Vol. II., p. 140.



In other patients of a similarly neurotic temperament such a functional disorder as palpitation may start the morbid train of symptoms. The palpitation may be so violent as to cause an apprehension of sudden dissolution, and this apprehension in turn keeps up, and indeed intensifies, the palpitation. The result is a concatenation of symptoms causing grievous distress.

**Vomiting.** A Circle may be set up when in heart disease an attack of vomiting is brought on either through the pneumogastric nerves or as a result of mechanical congestion of the stomach. "The vomiting forms a link in the Vicious Circle which may ultimately prove fatal; and if it refuse to yield it accelerates the end." <sup>1</sup>

**Intermittent Action.** Lastly, when some temporary cause has led to an intermittent action of the heart, a Circle may result from a mere repetition of the intermission. The habit of intermitting leads to an exaggerated irritability of the cardiac nerve centres, causing a continuance of the abnormal action even after the removal of the primary cause.

#### V.—CIRCLES ASSOCIATED WITH THE BLOOD-VESSELS AND LYMPHATICS.

The blood-vessels have already been more than once referred to as participating with the heart in the creation of Circles.

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<sup>1</sup> Mitchell Bruce, Principles of Treatment, p. 308.



But it will be convenient to describe under a separate heading some further conditions in which they play a prominent part.

**Arterio-Sclerosis.** Sir James Barr has drawn attention to the progressive and reciprocal relations that are established in arterio-sclerosis between the degenerative changes in the aorta (and its principal branches) and the degree of cardiac hypertrophy. The greater the strain on the arterial walls and the greater the loss of elasticity the greater the cardiac hypertrophy, and *vice versa*. "We thus get a Vicious Circle established, which soon works permanent mischief."<sup>1</sup>

Mackenzie has alluded to the same Circle :

"On the one hand, the changes in the blood-vessels undoubtedly tend to raise the blood-pressure, while it is contended that these are induced by the blood itself containing ingredients that provoke a contraction of the arterioles, in consequence of which the muscular coat hypertrophies. A rise in pressure seems to induce atheromatous degeneration, and this in turn causes a rise in pressure, and thus a Vicious Circle may be formed."<sup>2</sup>

**Aneurysm.** Aneurysm is frequently due to disease of the arterial walls, which consequently grow weak and yield to the blood-pressure. The more they yield the greater the tension, and the thinner and weaker do they become, thus provoking progressive dilatation.<sup>3</sup>

<sup>1</sup> *British Med. J.*, 1909, Vol. II., p. 61.

<sup>2</sup> *Diseases of the Heart*, p. 101.

<sup>3</sup> If T stands for tension, r for radius, and p for blood-pressure, the condition may be represented by the formula  $T = pr$ .

**Varicose Veins.** Another Circle is associated with varicose veins, whether these are due to increased intra-venous pressure or to diminished resisting power of the vein-walls. In either case the dilatation leads to increased tension on the vein-walls, and the increased tension aggravates the dilatation:

“ It is often impossible to say how the disorder originates. For the venous dilatation (due to some mechanical obstruction) and the anatomical changes in the vein-walls act reciprocally on one another. Thus a *Circulus Vitiosus* whose pathogenesis is obscure controls the course of events.”<sup>1</sup>

**Intra-Cranial Hæmorrhage.** Leonard Hill draws attention to a Circle which is established when intra-cranial hæmorrhage causes increased cerebral compression, and thus leads to a secondary increase of compression by the obliteration of the veins and capillaries in the affected area and a consequent congestive œdema :

“ The high blood pressure which exists in those capillary areas surrounding the seat of complete vascular obliteration will lead to increased transudation of fluid, since plasma may pass more easily into the brain substance than the blood through the compressed capillaries. The transudation will take place at almost arterial tension, will increase the volume of the foreign body, and so will lead to compression of other capillary areas. A *Circulus Vitiosus* is thus established and the cerebral anæmia may spread indefinitely.”<sup>2</sup>

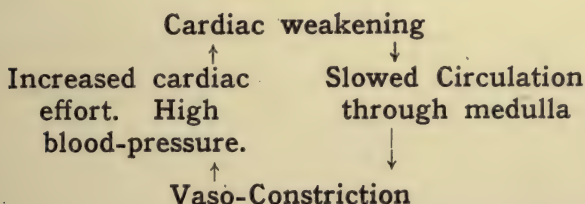
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<sup>1</sup> Romberg, *Krankheiten des Herzens und der Blutgefäße*, p. 496.

<sup>2</sup> *Physiology and Pathology of the Cerebral Circulation*, pp. 188, 197, 200.

Similar conditions occur in connection with meningitis and cerebral abscess and have been alluded to in Chapter II.

**Strain.** In cases of over-strain of the heart a Circle may be associated with a high blood-pressure. The slowing of the circulation due to the strain tends to produce asphyxia of the medullary centres, which asphyxia again stimulates those centres and induces intense vaso-constriction, as a result of which a larger quantity of blood reaches the medullary centres. Consequently the already weakened heart is called upon to make a special effort, and the weaker it is the more do the inexorable medullary centres demand an adequate supply of blood. The resulting Vicious Circle is thus graphically represented by Hirschfelder : <sup>1</sup>



**Inflammation.** According to Cohnheim a Circulus Vitiosus may be present when local inflammation leads to capillary stasis and coagulation. If the injury is so severe that complete repair is impossible, reciprocal relations are established ; the

<sup>1</sup> Diseases of the Heart and Aorta, p. 237.



inflammatory process leads to stasis and the stasis aggravates the inflammation.<sup>1</sup> He also draws attention to another Circle which is established during the processes of repair :

“ It is the fact . . . . . that the newly formed vessels and tissues themselves constitute fresh causes of inflammation. At any rate they may become so ; for the most trifling noxa at once alters the flow through them, and immediately leads to a renewal of the transudation and extravasation. . . . . A most pernicious *Circulus Vitiosus* now begins ; for while fresh exudation is repeatedly escaping from the new vessels, the exuded materials are meanwhile transformed into new vascularised membranes, so that, even when the original cause of the inflammation has long since disappeared, no rest is allowed the affected organ.”<sup>2</sup>

**Ascites.** Ascites and impeded diuresis are sometimes reciprocally related to each other :

“ Ascites may obstruct the escape of blood through the renal veins, and by thus retarding the circulation through the kidneys may diminish diuresis. An important *Circulus Vitiosus* may be established in this way, unless the œdema and transudations can be got rid of.”<sup>3</sup>

**Venous Obstruction.** An illustration of a Circle in which the lymphatics take part is met with in some cases of dropsy of the arm due to cancer of the breast, as Handley points out. The dropsy appears to arise from transudation of lymph from the

<sup>1</sup> General Pathology (N.S.S.), Vol. I., p. 339.

<sup>2</sup> L.c., Vol. I., pp. 374-5.

<sup>3</sup> Romberg, Krankheiten des Herzens und der Blutgefäße, p. 282.



capillaries. This causes venous obstruction and further rise in the capillary pressure and increased transudation :

“ The rise of pressure thus produced in the capillaries tends in its turn to increase the transudation of lymph and to aggravate the dropsy, and thus a Vicious Circle is set up.”<sup>1</sup>

## VI.—CIRCLES ASSOCIATED WITH THE BLOOD.

**Polycythæmia.** Disorders of the blood may give rise to various Circles. For example in chronic polycythæmia the excess of red corpuscles increases the viscosity of the blood and consequently throws an extra strain on the heart. The resulting increase of blood-pressure causes more fluid to escape from the blood-vessels, and thus again aggravates the viscosity. By this means, as Hirschfelder<sup>2</sup> points out, a Vicious Cycle is established.

**Malnutrition.** A symptom-complex is not uncommonly met with in neurotic women, where malnutrition, emaciation and anæmia both cause, and result from, brain-fag and nerve-fag. In other words “ a Vicious Circle is set up, the organs being first ill-nourished through failure of the nervous control, and then failing to supply the brain and nerves with good rich blood.”<sup>3</sup>

<sup>1</sup> *British Med. J.*, 1910, Vol. I., p. 854.

<sup>2</sup> *Diseases of the Heart and Aorta*, p. 30.

<sup>3</sup> *British Med. J.*, 1906, Vol. II., p. 13.

**Anæmia.** Other reciprocal relations may be established when fatty degeneration of some of the organs is associated with anæmia. Thus Cabot writes :

“ To the fatty degeneration of the endothelial cells of the blood-vessels may be attributed the fact that in many anæmic conditions a general hæmorrhagic diathesis develops, which not infrequently combines with the primary disease to form a Vicious Circle.”<sup>1</sup>

**Chlorosis.** A similar condition doubtless explains why chlorosis, although usually a cause of scanty menstruation, at times leads to menorrhagia and metrorrhagia, which in turn aggravate the chlorosis :

“ When a woman is chlorotic she fortunately has generally amenorrhœa, but if not, she will be very likely to have menorrhagia. And you have here an illustration of a Vicious pathological Circle. The menorrhagia increases the chlorosis, and, *vice versa*, the chlorosis aggravates the menorrhagia.”<sup>2</sup>

**Nephritis.** An important Circle may be established when in renal disease the blood is so polluted with the products of metabolism as to impair the nutrition and efficiency of the renal epithelium. The impaired nutrition and efficiency in turn keep the

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<sup>1</sup> Diseases of Metabolism and of the Blood, p. 308.

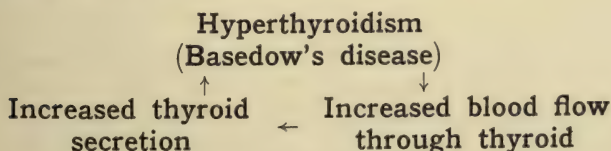
<sup>2</sup> Matthews Duncan, Lectures on the Diseases of Women, p. 124.

blood impure and so complete the Circle. The condition which Adami has well described is one which *vires acquirit eundo* :

“ Functional inadequacy of the kidneys is not without its effect upon the composition of the blood. The quantity of water eliminated may deviate considerably from the normal, and waste products may be retained instead of excreted. The quality of the blood is thus depreciated, and, being laden with toxic substances, it in turn exerts an irritating and deteriorating effect upon the kidneys. In this way a Vicious Circle is set up, as a result of which the condition of the patient goes rapidly from bad to worse.” <sup>1</sup>

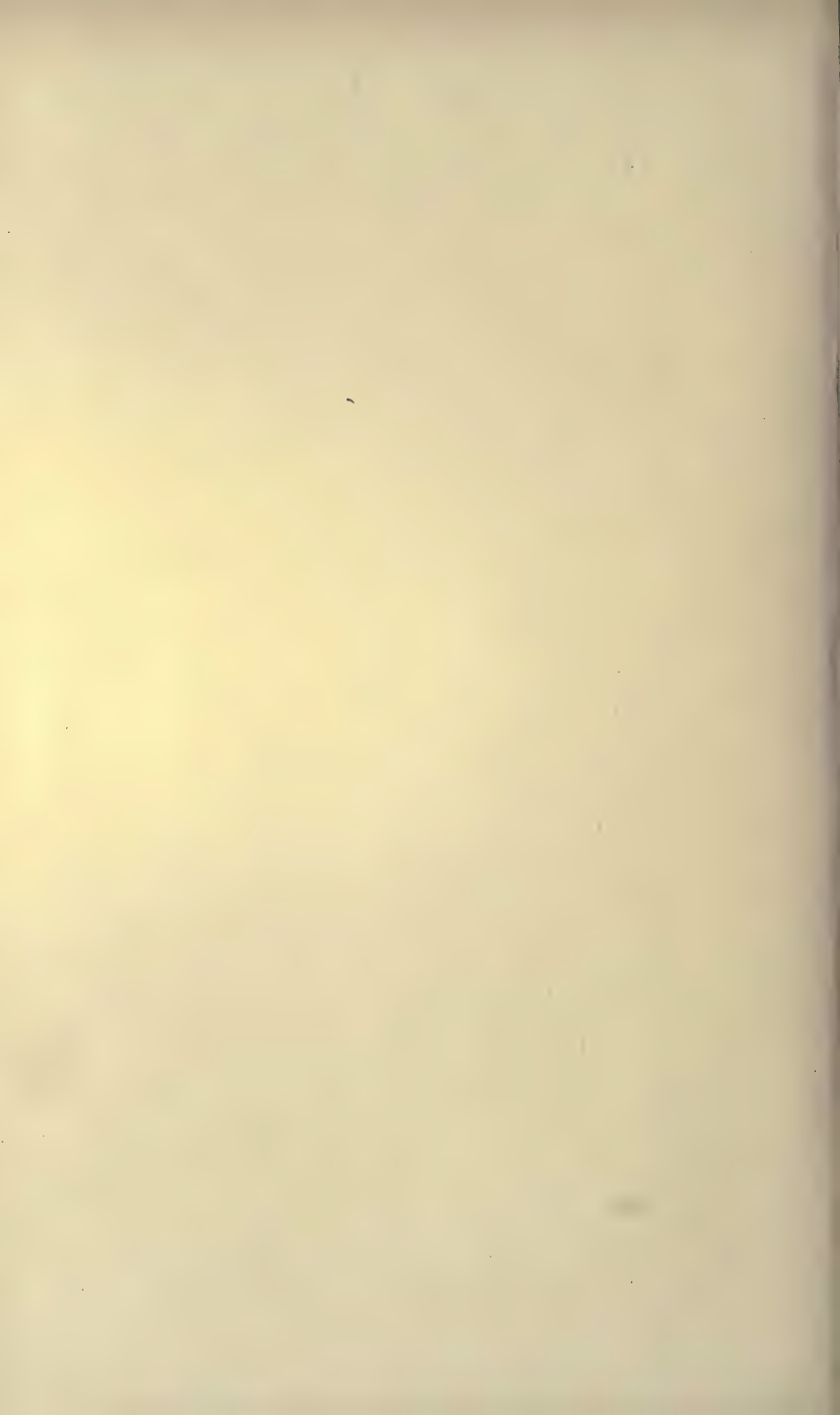
**Hyperthyroidism.** A Circle also occurs in Basedow's disease (hyperthyroidism) which has recently been shown by Cyon to be dependent upon an increased quantity of blood passing through the thyroid. The increased flow appears to cause an increased secretion of thyreo-globulin, and this in its turn causes more blood to pass through the thyroid and completes the Circle.

Hirschfelder <sup>2</sup> represents the sequence by the following diagram :



<sup>1</sup> Principles of Pathology, Vol. II., p. 735.

<sup>2</sup> Diseases of the Heart and Aorta, pp. 579, 585, 587 ; Rogers, *Annals of Surgery*, 1910, Vol. I., p. 151.





## Chapter Four.

### Circles associated with the Respiratory System.



THE natural Classification of these Circles Fig. (III.) is the following one :

- I. Circles associated with the Nose.
- II. Circles associated with the Trachea.
- III. Circles associated with the Bronchi.
- IV. Circles associated with the Lungs.
- V. Circles associated with the Pleura.

#### I.—CIRCLES ASSOCIATED WITH THE NOSE.

**Mouth-Breathing.** When the air reaches the lungs *via* the mouth instead of *via* the nose, some important reciprocal relations are established. Oral breathing diminishes the action of the nasal valve and conduces to turgescence of the mucous membrane of the nose, both of which promote nasal obstruction and oral respiration. In the words of Mayo Collier :

“A Vicious Circle is set up. Mouth-Breathing tends to obstruct the nose, and this very obstruction maintains and continues the mouth-breathing.”<sup>1</sup>

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<sup>1</sup> Mouth-Breathing, p. 12.

**Adenoids.** When adenoids are present, the nasal cavities are insufficiently aërated, and unhealthy infective secretions are retained. Hence results further hypertrophy of the adenoids with increase of nasal obstruction and oral respiration.

**Malformation.** Another Circle may be met with where dental irregularities have led to deformity of the superior maxilla. Here also mouth-breathing is frequently acquired and leads to irregularities of the teeth :

“ The patient acquires the habit of mouth-breathing, adenoids develop in the stagnating cavity, and the tonsils enlarge. A Vicious Circle is thus established, for persistent mouth-breathing leads to further irregularities of the teeth, and deficient expansion, especially of the maxilla.”<sup>1</sup>

**Catarrh.** A common cold may at times greatly diminish the resisting power of the nasal mucosa and so interfere with the vaso-motor mechanism. As a result an increased liability to cold is developed and each attack leaves the nose still more predisposed.

**Stenosis.** Where the nasal chamber is narrowed another self-aggravating factor may be present. The opposing sides may lie actually in contact, or approach so nearly that congestion of the lining mucosa brings them into contact. Under the ensuing pressure the circulation is impeded, the nose becomes stopped with the turgid soft tissues, and

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<sup>1</sup> *British Med. J.*, 1909, Vol. I., p. 396.

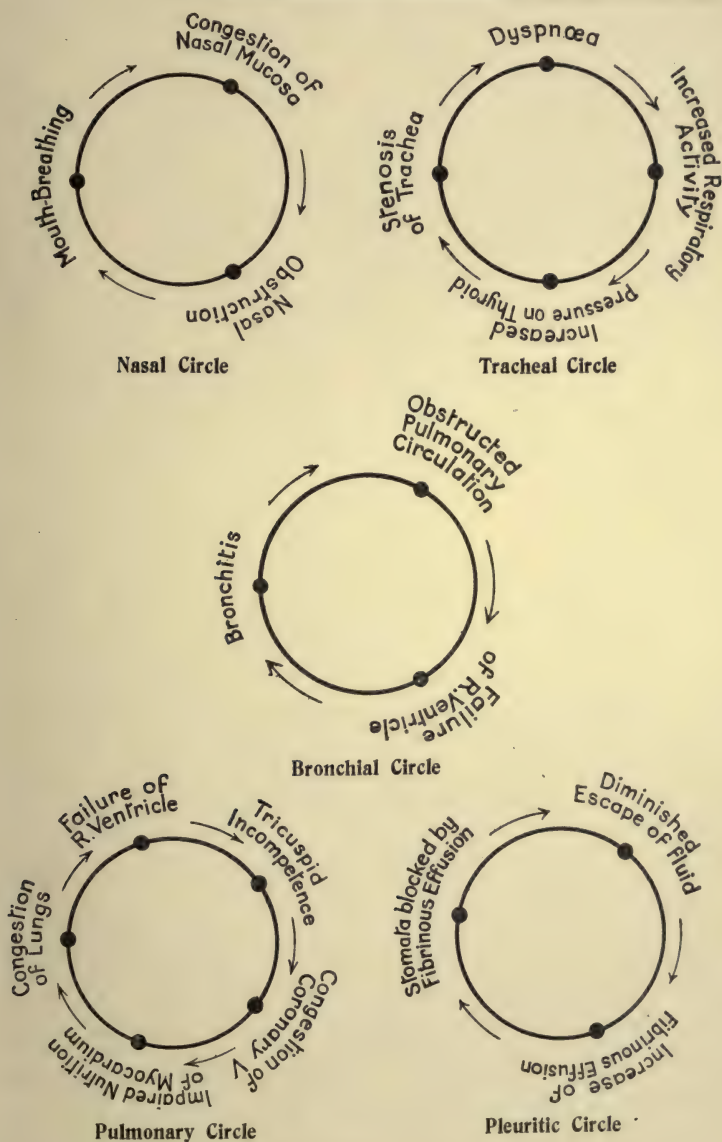


Fig. III. Circles associated with the Respiratory System.

drainage from the accessory sinuses is prevented. Here congestion breeds congestion and, as Risley points out, establishes a "Vicious Circle of events."<sup>1</sup>

## II.—CIRCLES ASSOCIATED WITH THE TRACHEA.

**Goitre.** In cases of enlarged thyroid, where this gland compresses the trachea and reduces the lumen to a scabbard-shaped slit, acute attacks of dyspnœa are met with. The dyspnœa, started perhaps by some casual effort, calls the supplementary respiratory muscles (especially the sterno-hyoids and -thyroids) into action. These, as they contract, press the hypertrophied thyroid against the trachea, further diminish the lumen, and increase the dyspnœa. Thus a Circle is formed which not infrequently ends fatally. Frænkel thus describes the condition :

"The sufferer gets into the clutches of a Vicious Circle. The greater the want of oxygen, the more vigorous and prolonged the muscular contractions ; the more vigorous the latter, the greater the compression of the trachea and the less room for the admission of air."<sup>2</sup>

Venous hæmorrhage into adenomatous cysts may also set up reciprocally acting correlations. The increased pressure on the trachea leads to dyspnœa, to over-filling of the right heart, and to congestion of the veins of the neck. This congestion in turn aggravates the hæmorrhage.

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<sup>1</sup> *British Med. J.*, 1906, Vol. II., p. 1,869.

<sup>2</sup> *Lungenkrankheiten*, p. 8.



**Enlargement of Thymus.** A similar Circle may be met with in connection with enlargement of the thymus and consequent thymic dyspnœa. In some cases "even the throwing of the head far back is sufficient to cause thymic enlargement and to set up a Vicious Circle that may quickly lead to suffocation."<sup>1</sup>

**Endotracheal Stenosis.** A Circle may occur when, instead of the trachea being compressed from without, there is endotracheal stenosis, due to syphilis, new growth or similar cause. The stenosis brings on dyspnœa and an increased activity of the respiratory muscles. This causes an over-filling of the right side of the heart during inspiration owing to the increased suction action. During expiration, on the other hand, the high intra-thoracic pressure exerted on the lungs hinders the entry of the blood into the lungs, the effect of which is to further increase the respiratory activity and dyspnœa. To quote Frænkel again :

"Any condition which accelerates the venous flow through the right side of the heart must under such circumstances aggravate the state of the patient. This applies especially to increased muscular activity, and to the increased dyspnœa necessarily associated with it. A Circulus Vitiosus is thus established as a result of the increased respiratory activity."<sup>2</sup>

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<sup>1</sup> Osler and Macrae, System of Medicine, Vol. IV., p. 799.

<sup>2</sup> Lungenkrankheiten, p. 29.

### III.—CIRCLES ASSOCIATED WITH THE BRONCHI.

**Bronchitis.** In acute bronchitis a Circle is frequently present. The bronchitis impedes the circulation through the lungs and thus leads to defective aëration of the blood. To overcome this obstruction the right ventricle at first beats more violently. But this compensation frequently becomes strained, the right ventricle dilates and leads to tricuspid incompetence. As a result of the cardiac failure the pulmonary circulation and aëration are further impeded.

A Circle may also be established by means of the bronchial veins which open into the vena azygos and the left superior intercostal vein. They are thus quickly affected and, when obstructed, aggravate the original bronchitis. The coronary veins, which open into the right auricle, suffer at an early stage, and their congestion impairs the nutrition of the myocardium on both right and left sides. The result is further hindrance to the pulmonary circulation and increased deficiency of aëration. As West points out :

“ The Vicious Circle thus established explains the rapid failure of the heart, which is so striking a feature in the later stage of many cases of bronchitis.” <sup>1</sup>

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<sup>1</sup> Diseases of the Organs of Respiration, Vol. I., pp. 128-130.

Similar pathological correlations may complicate chronic bronchitis when the compensatory hypertrophy of the right ventricle fails and aggravates the bronchitis. Romberg thus writes :

“ Under such circumstances attacks of chronic bronchitis are very common, and are materially intensified by the obstruction to the pulmonary circulation. . . . The dyspnœa caused by the bronchitis in its turn increases the cardiac weakness, and the resulting *Circulus Vitiosus* can only be broken by an improvement in the action of the heart.”<sup>1</sup>

**Emphysema.** Bronchitis and emphysema frequently stand in reciprocal relations to each other, as West has pointed out :

“ Though emphysema is commonly the result of bronchitis, still it also in turn leads to bronchitis, for the wasting of the alveoli and consequent destruction of vessels leads to obstruction to the circulation through the lungs, and, in the end, to dilatation of the right heart and systemic veins, and thus to congestion of the bronchi.”<sup>2</sup>

Amongst the numerous causes of bronchitis previous attacks hold an important place. Each fresh attack leaves its trace and by diminishing the resistance predisposes to recurrence.

**Cough.** A Circle may be established by a bronchial cough. Thus congestion of the bronchi produces paroxysms of coughing, which in their turn increase the congestion.

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<sup>1</sup> Krankheiten des Herzens und der Blutgefäße, pp. 156-7.

<sup>2</sup> Diseases of the Organs of Respiration, Vol. I., p. 112.



**Bronchiectasis.** In bronchiectasis the residues in the dilated tubes frequently serve as a nidus for bacterial decomposition, which causes local irritation and inflammation. Gases are generated which increase the internal or dilating pressure on the walls. "In this way the residual dilatation is progressive, unless the cause of it be brief, by starting a Vicious Circle which ends by aggravating the original disability."<sup>1</sup>

**Asthma.** In asthma a Circle may, according to Dixon, be established in the following way :—The act of inspiration is a powerful suction force, much greater than the force of expiration, which depends largely on the elastic tissue of the lungs. Hence an amount of air may be sucked through the bronchoconstriction, while the elastic recoil of the lungs is insufficiently powerful to expel the same amount. Consequently another inspiration will take place before complete expiration, and over-distention of the lungs will ensue. Dixon has pointed out how under such circumstances "a Vicious Circle was established; the more the chest expanded and the lungs over-distended the weaker its powers of expiration became."<sup>2</sup>

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<sup>1</sup> Mitchell Bruce, Principles of Treatment, p. 101.

<sup>2</sup> *Proc. Royal S. of Medicine*, 1909, Part III. (*Therapeutics*), p. 120.



The recurrence of asthma, that "paroxysmal neurosis," may in course of time so act on the nerve centres as to diminish their control and to induce a fresh attack on less and less provocation. Recurrence indeed is largely the result of previous attacks. The labile condition resembles that sometimes met with in epilepsy and in some forms of insanity.

#### IV.—CIRCLES ASSOCIATED WITH THE LUNGS.

Several Circles are met with in which the heart and the lungs are reciprocally involved.

**Pneumonia.** Attention has already been called in Chapter III. to the Circle that is frequently established in pneumonia. Owing partly to the impeded pulmonary circulation and deficient aëration, partly to the action of toxins, an unusual strain is thrown upon the right ventricle with a consequent risk of its dilatation and failure. When such failure supervenes, the weakened myocardium in its turn reacts on the lungs by further retarding the pulmonary circulation and diminishing the oxygenation of the blood. The lungs and heart reciprocally embarrass one another. As Frænkel puts it :

"The heart thus gets into a *Circulus Vitiosus*, since the blood-stasis causes a further diminution in the supply of oxygen on which the increased cardiac activity depends."<sup>1</sup>

Especially grave is the outlook if the heart was unsound to begin with. Then the pneumonic patient is indeed *inter malleum et incudem*.

**Congestion of Lungs.** Reciprocal relations may also be established in cases of mechanical congestion of the lungs, dependent on mitral or aortic disease. As the congestion extends backwards the coronary vein soon becomes affected, leading to general cardiac engorgement. The result is that the nutrition of the whole heart suffers and the pulmonary congestion is further increased. This condition is also a grave one ; indeed West sums up the prognosis with the words : “ a Vicious Circle is established which, if not broken, quickly leads to a fatal issue.” <sup>1</sup>

Hæmoptysis is often complicated by one of the “ most highly Vicious Circles in pathology—a Circle which is largely responsible for the profuseness and prolongation of the hæmorrhage. The intrapulmonary irritation of the effused blood causes cough : each act of coughing, like any other sudden exertion, causes rise of blood-pressure : each rise of blood-pressure is apt to cause fresh hæmorrhage ; and so on over again, the Circle continuing to revolve in many cases until the loss of blood has been sufficient to reduce the blood-pressure materially and thus terminate the hæmorrhage. This natural cure of hæmoptysis was, at one period in the history of

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<sup>1</sup> Diseases of the Organs of Respiration, Vol. I., p. 238.

Medicine, imitated by physicians who resorted to venesection in this emergency—a somewhat expensive, but by no means irrational, imitation.”<sup>1</sup>

**Cardiac Failure.** A vast Circle involving the lungs as well as the other viscera is met with in the later stages of chronic valvular affections. Gibson thus describes it :

“ Sooner or later, according to its form and severity, chronic valvular disease, with compensation, itself disposes to failure by establishing a Vicious Circle of slow progressive impairment of the viscera and their great vital functions—the lungs, liver, stomach, bowels, kidneys, indeed the myocardium itself.”<sup>2</sup>

The *besoin de respirer* caused by over-strain of the heart sets up a Circle in mountain sickness according to Clifford Allbutt.<sup>3</sup> At times temporary cardiac dilatation may be superadded, aggravating the distress.

**Visceral Disorders.** Correlations between pulmonary and digestive disorders are not uncommon. Barbier, for example, in describing the dyspepsia associated with pulmonary tuberculosis, says :

“ These visceral troubles add to the wretchedness of the sufferer. Not only are they caused by the tuberculosis, but they accelerate its progress, both by diminishing the power of resistance and by inducing other complications associated with tubercle. . . . Thus is established in all its mischievous correlations that Vicious Circle which so often complicates phthisis.”<sup>4</sup>

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<sup>1</sup> Hare, Food Factor in Disease, Vol. II., p. 97.

<sup>2</sup> Textbook of Medicine, Vol. II., p. 127.

<sup>3</sup> Allbutt and Rolleston, System of Medicine, Vol. III., p. 249.

<sup>4</sup> Brouardel et Gilbert, Maladies des Bronches et des Poumons, p. 495.



**Malnutrition.** Where the cough of a consumptive patient is accompanied by much vomiting, an inadequate supply of food may be retained, thus giving rise to malnutrition. This diminishes the power of resistance and accelerates the progress of disease.

**Tuberculosis.** Some important neuroses may also be established by pulmonary disease. For example the nervous pessimism and melancholy sometimes accompanying tuberculosis are injurious to the consumptive person, by rendering him disinclined for the struggle back to health, and by robbing him of the pluck necessary for successful treatment. In this way the neurosis militates against recovery. "Pour guérir de la tuberculose, il faut vouloir guérir, le vouloir bien, le vouloir longtemps."

**Cough.** Occasionally excessive and prolonged coughing may so irritate and exhaust the medullary centre as to pervert the reflex mechanism. The cough becomes uncontrollable, and persists even after the local irritation has ceased, causing further exhaustion of the centre.

**Psychoses.** Another Circle may be present in many cases of toxic psychoses which are complicated



by tuberculosis, as so often happens in the later stages of mental disease. Thus Mott writes :

“ It is impossible to say whether the tuberculous toxin is a cause or an additional factor in the production of the mental phenomena. Certainly a Vicious Circle tends to be produced, for refusal of food and impaired nutrition, with slow and shallow respiration and feeble circulation, tend toward rapid progress of the infective process, and thereby an increased amount of tuberculous toxin is poured into the blood.”<sup>1</sup>

**Auto-Infection.** A Circle may be established by auto-infection when a tuberculous patient re-inoculates himself with sputa coughed up from a primary lesion in the lung. For example, infective sputa may start a secondary focus in the larynx, and hence be aspirated into the sound lung. In this way the mischief may spread far and wide.

**Obesity.** Obesity again may be complicated by a similar “ Vicious Circle of malign events.” The play of the lungs is hampered, oxygenation is defective, and there follows an increased tendency to obesity. Indeed feeble respiratory movements from any cause whatever may lead to defective nutrition of the lungs, since such nutrition depends largely on adequate movements. Feeble movements and impaired nutrition thus come to act and react on each other.

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<sup>1</sup> Allbutt and Rolleston, System of Medicine, Vol. VII., p. 225.

**Emphysema.** Another Circle is sometimes associated with emphysema, especially in stout and plethoric patients with too good an appetite, who require more oxygen than the lungs can supply. The plethora and cyanosis lead to congestion of the lungs and to greater respiratory efforts, whereby the emphysema is increased. In the words of Sir James Barr : " The patient thus gets into a Vicious Circle, from which it requires some judgment and determination to extricate him." <sup>1</sup>

**Anæmia.** Reduced activity of the respiratory centre is responsible for several Circles. Thus anæmia may produce inertia of the nervous system, leading to depression of all the vital functions, and " the patient lies in the Vicious Circle of a reduced activity of the respiratory centre, due to the anæmia it should help to dispel." <sup>2</sup>

**Asphyxia.** Another form of reduced respiratory activity is sometimes due to a very different cause, viz. prolonged convulsions, as met with in the status epilepticus and in some cases of general paralysis. Here, as Mott points out, " the mechanical conditions are such as to produce a Vicious Circle terminating in progressively increased venosity of the blood in the

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<sup>1</sup> *British Med. J.*, 1908, Vol. I., p. 913.

<sup>2</sup> Allbutt and Rolleston, *System of Medicine*, Vol. V., p. 723.

cortex, especially in that portion supplied by the carotid arteries, the veins of which drain into the longitudinal sinus.”<sup>1</sup>

A Circle often present towards the close of life is due to slow asphyxia brought about by the gradual interruption to the function of respiration. The oxygen-content may fall to a mere trace. The effect of the non-oxygenated blood on the brain causes a general narcosis resulting in frequent and shallow respirations which gradually weaken until life ebbs away.

#### V.—CIRCLES ASSOCIATED WITH THE PLEURA.

**Pleurisy.** As in the case of pericarditis so in pleurisy, we often meet with persons who have recovered, but in whom unfortunately there has been no *restitutio ad integrum*. Recovery has been at the cost of some residual lesion, and of a diminished power of resistance. The damaged pleura on trivial exposure is attacked afresh, and each time the mischief increases, until the cumulative effect is very considerable. The primary lesion by diminishing the power of resistance has led to recurrence; recurrence has aggravated the primary lesion.

In pleurisy with effusion several Circles may be created, owing to interference with the lymphatic pump by which a constant circulation of fluid into,

<sup>1</sup> Allbutt and Rolleston, System of Medicine, Vol. VII., p. 226.



and out of, the pleuritic cavity is maintained. During health that pump is worked by means of the respiratory movements acting on the lymphatics and stomata. In cases of pleuritic effusion, however, the fibrinous exudation may block the stomata and check the removal, in this way causing an increase, of the effusion. It is much as if with a leaking ship the pumps were plugged by sea-weeds pouring in with the water.

Again, the effusion, if abundant, may exert direct pressure on the stomata and superficial lymphatics and thus block the channels by which it should be absorbed. It may further act by reducing or abolishing the respiratory movements on which depends the efficiency of the pump.<sup>1</sup> The improvement that so often follows paracentesis, even when only a small quantity of fluid is removed, is probably due to the breaking of the Circle by such removal. The lymphatic pump has again begun to work.

**Hydro-Thorax.** Non-inflammatory dropsy of the pleura, due to heart disease or to an altered state of the blood (*e.g.* Bright's disease), acts in a similar manner. The dropsy aggravates the disease from which it sprang, and combines with the other morbid conditions to form a Vicious Circle which may give the *coup de grâce*.

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<sup>1</sup> West, *Lancet*, 1905, Vol. I., p. 787.



**Failure of Protective Mechanisms.** Respiratory disorders admirably illustrate the proposition that Vicious Circles frequently arise from a failure of the protective mechanisms by means of which the body resists disease. Amongst such mechanisms are sneezing, coughing, expectoration, increased respiratory and cardiac activity, hæmoptysis and ciliary action.

Some examples of such failure may be given.

**Pneumonia.** A Circle has already been described in connection with pneumonia, due to the unusual strain on the right ventricle in its efforts to carry on the circulation through the partially blocked lungs. Here the beneficent provision of Nature is seen in the reserve energy which the right heart possesses, and in the increased cardiac activity which accompanies the onset of pneumonia. In favourable cases these beneficent provisions play a large part in recovery. If, however, the pulmonary obstruction prove too severe a strain, dilatation of the right ventricle is brought about, and a Vicious Circle is established. The pulmonary stasis has led to cardiac dilatation, and the dilatation aggravates the pulmonary stasis. The associated pyrexia and toxæmia act in the same direction. Thus heart and lungs reciprocally embarrass each other.

**Pulmonary Congestion.** A second illustration is found in pulmonary congestion due to mitral or aortic disease. The overloading of the pulmonary

vessels is at the outset a relief to the over-taxed ventricle and is an example of one organ relieving another when in distress. The border line is however easily overstepped. As soon as the right heart begins to suffer, and stagnation begins to hinder oxygenation, mischief follows. The imperfectly oxygenated blood impairs the contractility of the heart and renders it even less competent than before to carry on the circulation. The accommodating beneficent action has been replaced by the reciprocally injurious condition. The vicarious assistance has ended in a Vicious Circle.<sup>1</sup>

**Tuberculosis.** The expectoration of tuberculous sputum is another beneficent provision of Nature intended to eliminate the bacillus from the body. At times, however, that expectoration is the means of infecting the larynx, from which in turn fresh lobes of the lung are inoculated.

**Hæmoptysis.** Again, hæmoptysis must be regarded as a means for the removal of the accumulated blood which is irritating the respiratory tract. But if the cough is the means of raising the blood-pressure and thus starting fresh hæmorrhage, it does harm and may prove fatal. Instead of gain we have loss.

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<sup>1</sup> Mitchell Bruce, Principles of Treatment, p. 133.

## Chapter Five.

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### Circles associated with the Digestive System.



DISORDERS of digestion (Fig. IV.) are usually complicated by the operation of Vicious Circles. This liability arises in part from the interdependence of the chemical, physical and vital processes associated with digestion ; in part also from the close sympathy between the gastro-intestinal tract and other organs, even the most remote. Disease here sooner or later breeds disease there, action and reaction being in continuous operation. A regional Classification will be found the best for practical purposes.

- I. Circles associated with the Mouth.
- II. Circles associated with the Œsophagus.
- III. Circles associated with the Stomach.
- IV. Circles associated with the Intestines.
- V. Circles associated with the Rectum and Anus.

#### I.—CIRCLES ASSOCIATED WITH THE MOUTH.

To this Group belong some Circles of interest both to the medical and to the dental practitioner.

**Oral Sepsis.** Oral sepsis, for example, leads to dental caries ; dental caries in its turn leads to oral sepsis.

Again, oral sepsis diminishes the activity of the muscles of the oro-pharynx and thus impedes the removal of muco-pus. This also, as Stewart has pointed out, aggravates the oral sepsis and creates a true Vicious Circle. <sup>1</sup>

The deposition of tartar from the saliva initiates a Circle by irritating the gum and causing it to recede from the tooth, leaving the neck and fang exposed. The exposed fang in its turn receives a coating of tartar, which excites further irritation and recession, and so the morbid process is continued, ending frequently in the loss of the tooth. <sup>2</sup>

Oral sepsis may have constitutional as well as local results, and lead to gastro-intestinal catarrh and consequent malnutrition. Here again action and reaction occur, since the systemic disorder lowers the resistance of the tissues and thus propagates the infection and absorption. <sup>3</sup>

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<sup>1</sup> *Lancet*, 1909, Vol. I., p. 1822.

<sup>2</sup> *Lancet*, 1894, Vol. I., p. 467.

<sup>3</sup> Spokes, *Lancet*, 1906, Vol. I., p. 509.



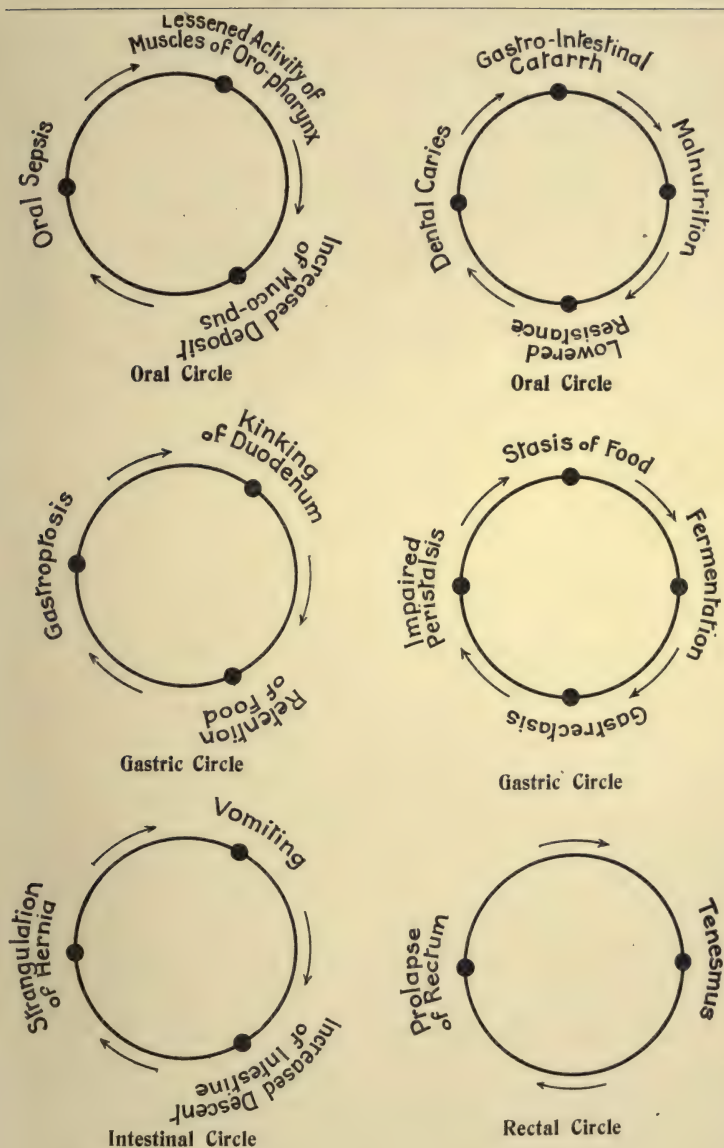


Fig. IV. Circles associated with the Digestive System.

**Stomatitis.** Krehl has drawn attention to the reciprocal relations established between ptyalism and mercurial stomatitis :

“ Mercurial stomatitis usually follows the ptyalism, and is due to some irritating mercurial compound present in the saliva. This stomatitis will, in turn, increase the salivation, thus establishing a Vicious Circle.” <sup>1</sup>

**Imperfect Development of Maxillæ.** The constitutional effects may also shew themselves by hindering the full development of the maxillæ. Such imperfect development in its turn promotes caries and malnutrition, especially in early life. Goadby thus describes the condition : “ Among children we find impaired nutrition and with it impaired growth ; with this, again, badly developed maxillæ and thus the Vicious Circle is complete.” <sup>2</sup>

**Sordes.** Sordes due to extreme exhaustion interfere with mastication and digestion ; the lessened absorption aggravates the exhaustion.

## II.—CIRCLES ASSOCIATED WITH THE ŒSOPHAGUS.

**Œsophageal Pouches.** These pouches are uncommon and of but little importance. Yet for the sake of completeness allusion may be made to the Circle occasionally associated with œsophageal,

<sup>1</sup> Clinical Pathology, tr. by Hewlett, p. 247.

<sup>2</sup> *British Med. J.*, 1904, Vol. II., p. 440.

or rather pharyngeal, diverticula, since the neck of the pouch passes through the lower constrictor of the pharynx.

As food enters and distends the sac in such cases the œsophagus below the sac is apt to be compressed, causing more food to enter the sac and consequently increasing the distension. Moreover as the pouch gets longer, it comes to form the direct continuation of the pharynx, and this again causes more and more food to enter. Decomposition of food is also liable to occur, leading to inflammation and weakening of the sac wall, followed by increased dilatation.

Lastly, the absorption of products of decomposition lessens resistance both locally and generally, action and reaction aggravating each other.

### III.—CIRCLES ASSOCIATED WITH THE STOMACH.

Owing to the large number of these Circles it will be convenient to arrange them in two divisions.

- (a) Circles affecting the Stomach and other Digestive Organs.

**Atonic Dyspepsia.** An excellent example occurs in atonic dyspepsia, a disorder in which peristalsis, secretion and absorption are all involved. Indeed these three functions are so closely connected that

disturbance of the one affects the other two. Ewald thus describes the morbid correlations :

“ Defective muscular movement reacts by diminishing the activity of absorption, defective absorption leads to stasis in the venous area, and this again to injury to secretion, so that a Vicious Circle is created. You can easily perceive that it is quite the same at whichever end you begin this chain ; whether the first trouble is secretory or motor, or absorption is affected, the same results must always follow, unless the failure of one function can be compensated for by the stronger action of another, by which the disturbance might be rectified.”<sup>1</sup>

**Anæmia.** Anæmia is sometimes associated with atonic dyspepsia, especially in chlorotic young women. The defective quality of the blood supplied to the stomach further tends to enfeebled peristaltic movements, and hence to defective nutrition of the stomach, for it must never be forgotten that the stomach, like the heart, depends largely on its movements for its blood-supply, and consequently for its nutrition.

**Retention of Ingesta.** Another complication is frequently added when imperfectly digested food is retained too long in the stomach. For under such circumstances irritation and catarrh are readily set up, and further enfeeble the musculature.

Strümpell thus describes the condition :

“ Imperfect digestion or dyspepsia excites a catarrh of the gastric and intestinal mucous membrane, by which again, in a Vicious Circle, the digestive power is still further reduced.”<sup>2</sup>

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<sup>1</sup> Diseases of the Digestive Organs (N.S.S.), Vol. II., p. 484.

<sup>2</sup> Textbook of Medicine, p. 387.



**Dilatation of Stomach.** Dilatation of the stomach is a more serious consequence of the morbid correlations established by prolonged retention of food. Decomposition and fermentation are likely to occur as a result of the dilatation, and may generate such a quantity of gas that the stomach yields to the pressure. When such is the case the dilatation increases the stasis and the stasis the dilatation :

“Dilatation may be the cause, accompaniment or sequel of chronic gastritis ; subacidity with fermentation and stagnation forms a Vicious Circle constituting Cohnheim’s so-called vinegar and gas factory, and may likewise be regarded as an important etiological factor.”<sup>1</sup>

**Boulimia.** In many of these cases boulimia is present, resulting from, as well as aggravating, the gastric dilatation. Here also a Circle forms and dilatation aggravates itself automatically.

**Kinking of Duodenum.** Occasionally the enlarged and loaded stomach sinks in the abdomen and pulls down the horizontal section of the duodenum. The result is a kinking of the intestine which hinders the escape of the contents of the stomach, and, as Glenard<sup>2</sup> points out, promotes a further tendency to dilatation and gastroptosis.

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<sup>1</sup> Osler and Macrae, *System of Medicine*, Vol. V., p. 285 ; Cohnheim, *Lectures on General Pathology* (N.S.S.), pp. 859, 862.

<sup>2</sup> Virchow, *Archiv*, Vol. CLVI., 1899, p. 306.

**Gastritis.** When acute gastritis results from food that is either irritating in quality or excessive in quantity, an even graver condition results. For the correlations above described are intensified by the presence of inflammation, as Ewald has well described :

“ The impaired secretion and peristalsis give rise to inflammation of the mucosa, which in its turn further checks the gastric secretion and thus establishes a Vicious Circle *in optima forma*. Putrefactive and fermentative decomposition supervenes as an aggravating factor.” <sup>1</sup>

**Gastric Ulcer.** An interesting Circle is established in cases of ulcer of the stomach, when adhesions are formed round the base of the ulcer, doubtless due to an effort of Nature to prevent perforation, or to localise the subsequent peritonitis, should the ulcer give way. Unhappily, however, such adhesions are by no means an unmixed blessing, since they cause fixation of the ulcer, prevent it undergoing the contraction which is so necessary for repair, and thus interfere with recovery.

**Intestinal Catarrh.** Somewhat wider Circles embrace the intestines and the liver, the portal area in fact. If, for example, imperfectly digested food escapes through the pylorus a catarrh of the intestines is set up which in its turn reacts on the stomach. Ewald <sup>2</sup> goes so far as to say that this Vicious Circle

<sup>1</sup> Eulenburg, Real-Encyclopädie der gesammten Heilkunde, Vol. XIV., p. 258.

<sup>2</sup> Do., p. 269 ; Lectures on Diseases of the Digestive Organs (N.S.S.), Vol. II., pp. 486, 487, 526.

(Zirkelschluss) occurs in all gastric disorders. Equally intimate is the correlation between stomach and liver. Every gastric and intestinal derangement reacts on the liver, while conversely every liver derangement reacts on the stomach. Lauder Brunton, who noticed how the composition of the blood made to circulate through an excised liver affected the rate of flow, suggests the following explanation :

“ Indiscretion in eating or drinking disturbs the digestive processes in the stomach and intestines ; the products of imperfect digestion or of decomposition in the intestine being absorbed into the veins pass to the liver ; they may there induce an obstructed flow through the hepatic capillaries ; the venous blood returning from the stomach and intestines will no longer be able to find an easy passage into the general circulation, and venous congestion of the stomach and intestines will be the result. Such venous engorgement as this will interfere with gastric and intestinal digestion, and this again will react upon the liver. Here, then, is a Vicious Circle which it is necessary to break.” <sup>1</sup>

**Pica.** An infective Circle is sometimes established, particularly in children, by the presence of the *ascaris lumbricoides* or the *ankylostoma duodenale*. These parasites are apt to cause a perverted appetite taking the form of pica or geophagy. Under these circumstances earth or even fæces may be eaten, and as the ova are excessively common in the soil this indulgence often increases the infection. In other words the earth hunger is both cause and effect of the infection.

<sup>1</sup> Disorders of Digestion, p. 25.



(b) Circles affecting the Stomach and other Organs not concerned in Digestion.

We may now deal with Circles associated with the stomach in its so to speak foreign relations, in its relations to organs unconnected with digestion.

Hippocrates has a famous aphorism :

ὥσπερ τοῖσι δένδρεσιν ἡ γῆ, οὕτω τοῖσι ζώουσιν ἡ γαστήρ<sup>1</sup>

and it is on this relation of the stomach to the animal that many Circles depend. If the animal is out of health, the stomach suffers. If the stomach is out of health, the animal suffers. This Vicious Circle embraces the problem of nutrition in all its ramifications. But some organs are more susceptible than others.

**Malnutrition of Nerve Centres.** The delicate tissues of the central nervous system would on *a priori* grounds be likely to suffer early from gastric disorder, and such is found to be the fact. Gastric disorders rapidly disturb the nerve centres, and ill-nourished nerve centres rapidly react on the gastric functions, stomach and brain reciprocally embarrassing each other. Worse still, if in consequence of stasis and decomposition of food, poisons are brewed and the blood which should nourish the nerve tissues is itself tainted. Can one wonder that, under

<sup>1</sup> "What the soil is to the tree the stomach is to the animal."



such conditions, interactions are set up which it is not easy to unravel ?

**Neurasthenia.** At other times it is difficult to say whether the trouble begins in the nervous system or in the stomach. Thus in neurasthenia, whether of spontaneous or of traumatic origin, protracted repose may so derange the gastric functions and affect the general health, that all inclination for mental and physical exertion vanishes. The patient becomes pre-occupied with his own sensations, and a Circle is soon established between the psychical condition and the digestive functions of the body. Gastric hyperæsthesia is frequently met with under these circumstances, as Mathieu points out :

“ La douleur, la diminution du coefficient général de la nutrition, l'inquiétude sur leur santé amènent souvent l'éclosion d'un état de nervosisme. . . . Ce nervosisme ainsi accru est une cause nouvelle d'hyperesthésie stomacale, de douleur plus intense et de spasme du pylore. C'est un Cercle Vicieux dont les affections dyspeptiques présentent de fréquents exemples.”<sup>1</sup>

**Neurotic Dyspepsia.** In women especially are such correlations common. Thus Axenfeld describing the neurotic dyspepsia of females says :

“ Si l'état dyspeptique s'accroît davantage encore, la malade tourne dans un véritable Cercle Vicieux morbide ; le nervosisme ayant créé la dyspepsie, celle-ci produit l'anémie qui, à son tour, entretient dans le système nerveux cet état si pénible de faiblesse irritable dont souffrent les malades.”<sup>2</sup>

<sup>1</sup> Traité des Maladies de l'Estomac et de l'Intestin, p. 230.

<sup>2</sup> Traité des Névroses (1883), p. 888.

Schofield also lays stress on these reciprocal conditions :

“ A Vicious Circle is often kept up in these cases which it is absolutely essential to break. They begin, it may be, with loss of appetite from some slight cause. This . . . leads to disordered thoughts, and the idea of disease is started. This, again, makes the appetite still more capricious ; the thoughts therefore get still worse, and so the body starves the brain, and the brain starves the body.”<sup>1</sup>

**Cardiac Disorder.** Various Circles are set up between the stomach and the heart, often causing the sufferer acute anxiety. A common example is met with where worry or insomnia has led to an irregular and weak cardiac action, and hence to congestion and œdema of the stomach and intestines. Dyspeptic disorders follow and further depress the heart, a reciprocal relationship being established between them. If the heart is unsound, the disorder is still more readily produced, as Robin has described :

“ Vous vous rappelez combien les troubles gastriques peuvent retentir sur le cœur sain ; à plus forte raison seront-ils capables d'impressionner un cœur déjà malade, quand même ils trouveraient en lui leur origine. Ce Cercle Vicieux où le cœur malade crée les gastropathies qui retentissent sur lui est extrêmement fréquent et son diagnostic vous évitera bien des erreurs de pratique.”<sup>2</sup>

<sup>1</sup> Nerves in Disorder, p. 162 ; Management of a Nerve Patient, p. 82.

<sup>2</sup> Les Maladies de l'Estomac, p. 966.

Lastly, one of the gravest of Vicious Circles accompanies a degenerating myocardium, a Circle that may begin imperceptibly and steadily widen until it involves well-nigh every organ. *Vires acquirit eundo*. Gibson thus describes it :

“ Sooner or later, according to its form and severity, chronic valvular disease with compensation itself disposes to failure, by establishing a Vicious Circle of slow progressive impairment of the viscera and their great vital functions—the lungs, liver, stomach, bowels, kidneys, indeed the myocardium itself.”<sup>1</sup>

**Stretching of Mesentery.** A mechanical Circle may be caused by a stretching of the mesentery across the duodenum in cases of gastrectasis :

“ In some of the cases of acute paralytic dilatation of the stomach it would appear that the small intestines have been driven downwards and backwards into the pelvis by the enlarging organ, and that the mesentery has been drawn tightly across the duodenum. In such cases, in addition to the stomach, the duodenum is distended to the point at which it is crossed by the mesentery, and a Vicious Circle is thus established.”<sup>2</sup>

Albrecht<sup>3</sup> draws attention to a curious Circle arising in such cases of obstruction owing to the fact that any water that is imbibed cannot reach the intestines, and consequently is neither absorbed nor quenches thirst. The result is that the unallayed thirst causes more water to be drunk, producing

<sup>1</sup> Textbook of Medicine, Vol. II., p. 127.

<sup>2</sup> Barnard, in Allbutt and Rolleston, System of Medicine, Vol. III., p. 769.

<sup>3</sup> Virchow, *Archiv*, Vol. CLVI. (1899), p. 306.



increased distension of the stomach, increased obstruction, and increased difficulty in satisfying thirst.

A number of drugs and food accessories create Circles in connection with the stomach. But as they have an artificial origin, the reader is referred for an account of them to Chapter VII.

#### IV.—CIRCLES ASSOCIATED WITH THE INTESTINES.

Many of the gastric Circles alluded to above apply *mutatis mutandis* to the intestines. Such for example is the case in regard to congestion of the stomach and a failing myocardium ; defective peristalsis dependent upon stasis and decomposition of the ingesta ; dyspepsia and enfeebled nutrition. These need not be further alluded to.

Other Circles apply particularly to the intestines, and are largely concerned with their anatomical relations.

**Strangulation of Intestine.** When a coil of intestine is strangled, its lumen is distended with blood and with gas. As a result of the tension fresh coils of gut are drawn into the constricting ring and in their turn are strangled and distended. The mesentery also takes part, for, as Barnard points out, "these coils draw their mesentery along with them within the constriction, which in this way becomes tighter and tighter in a Vicious Circle."<sup>1</sup>

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<sup>1</sup> Contributions to Abdominal Surgery, p. 9.



Barnard also draws attention to another Circle which accompanies acute obstruction. The rapid accumulation of blood, secretion and gas above the stenosis causes great distension and elongation of the alimentary canal from the obstruction to the stomach, leading to increased intra-abdominal tension :

“ The sudden rise of intra-abdominal tension will interfere with the circulation, and the gases will no longer be absorbed from the intestinal lumen, and will rapidly increase the distension, thus establishing a Vicious Circle.”<sup>1</sup>

**Meteorism.** Krehl lays stress on the important part meteorism plays under these conditions :

“ It would appear that diminished muscular tonus and insufficient absorptive capacity are of much greater importance in the production of tympanites than is an excessive formation of gases. For this reason, meteorism is especially marked in peritonitis and acute strangulation. If the intestines once yield to the pressure of gases within them, a Vicious Circle is established, for this very distention embarrasses their circulation, and so diminishes their ability to absorb gas.”<sup>2</sup>

**Colic.** Ordinary colic, due to the temporary arrest of irritating food, supplies a further illustration :

“ All factors that directly or indirectly cause motor activity of the intestines can occasion colicky attacks, because every acceleration of peristalsis in the upper loops causes an accumulation of contents and increased pressure in the adjacent intestine. A Circulus Vitiosus results : the peristalsis increases the stasis above the obstacle and the stasis excites the peristalsis.”<sup>3</sup>

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<sup>1</sup> Contributions to Abdominal Surgery, p. 5.

<sup>2</sup> Clinical Pathology, tr. by Hewlett, p. 324.

<sup>3</sup> Sklodowski, in Nothnagel's Diseases of the Intestines and Peritoneum, p. 367.

Hutchinson draws attention to a Circle associated with colic in breast-fed infants, due to their being fed too often or irregularly :

“ The tendency to overfeeding in these cases is a natural one, because the taking of warm milk into the stomach . . . temporarily relieves the colic, and the mother, finding the child is relieved by suckling, tends to go on giving the breast too often, and so a Vicious Circle is set up ; and what you have to set yourself to do is to break that Vicious Circle by seeing that the child is fed regularly by the clock, and not at irregular intervals.”<sup>1</sup>

**Intussusception.** Another Circle is met with in intussusception, where the intussusceptum excites the intussusciens to vigorous peristalsis. The peristalsis in turn increases the length of the invaginated intussusceptum, cause and effect acting and reacting reciprocally on each other. In the case of hernia the ring tends to enlarge every time the gut descends, which enlargement facilitates a re-descent of the gut. A strangulated hernia associated with secondary vomiting supplies another example, since the strangulation provokes the vomiting and the vomiting increases the strangulation.

**Colitis.** The close connection between the intestines and the central nervous system is seen in membranous colitis with its frequent nervous complications. In fact the local and the neurotic

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<sup>1</sup> Lectures on Diseases of Children, p. 47.

condition appear often to play into each other's hands, as Mathieu points out :

“ Dans la cõlíte muco-membraneuse .... il semble toutefois y avoir là souvent un véritable Cercle Vicieux ; le nervosisme et l'affection colique retentissent l'un sur l'autre et s'exagèrent réciproquement.”<sup>1</sup>

**And again :**

“ La cõlíte, les douleurs qu'elle provoque, les troubles de la nutrition qu'elle amène, sont de nature à créer ou à entretenir l'état nerveux. Le nervosisme à son tour exagère les phénomènes de cõlíte : c'est un Cercle Vicieux.”

**Sprue.** Manson has drawn attention to a “ Vicious pathological Circle ” associated with sprue, especially as met with in the half-starved populations of Eastern countries. In sprue digestion and assimilation are early affected, leading to tissue starvation and in time to the destruction of the mucous membrane of the alimentary canal :

“ As a result of this destruction .... digestion and absorption cannot be effected ; thus, so far from proving a benefit to the starving, good food and plenty of it does but precipitate death, inducing by its mechanical and chemical effects further irritative changes in the starved and eroded bowel.”<sup>2</sup>

**Biliary Calculus.** The growth of biliary calculi is associated with the operation of a Circle. In whatever way the nucleus may have been primarily

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<sup>1</sup> *Traité des Maladies de l'Estomac et de l'Intestin*, pp. 288, 304.

Allbutt and Rolleston, *System of Medicine*, Vol. II., (ii.), pp. 550, 557.



formed, its presence sets up irritation and catarrh of the mucous membrane of the gall-bladder, causing disintegration of the epithelial cells, amongst which cholesterin, bilirubin-calcium and micro-organisms are deposited. These adhere to the nucleus and increase its size, as a result of which ingravescent irritation and catarrh are excited, and so the process continues.

**Appendicitis.** A Circle may also be set up in those cases of appendicitis which are followed by recovery, although there is no *restitutio ad integrum*. Recovery is at the cost of some permanent anatomical lesion and of lessened resistance to fresh attacks. The first attack has bequeathed a liability to recrudescence on trivial provocation and each time the lesion increases. The acute attack and the lowered resistance act and react on each other, ending but too frequently in a fatal catastrophe.

**Ascites.** Mention has already been made of the Circle associated with a failing heart and an impure blood-supply due to visceral congestion and stasis. If the stasis is so severe as to lead to ascites, the abnormal pressure conditions will aggravate the heart failure and thus cause grave peril to life. The ascitic effusion, by pressing on the renal veins, may also impede the excretion of urine; the impeded excretion further increases the ascites.



## V.—CIRCLES ASSOCIATED WITH THE RECTUM AND ANUS.

There are numerous Circles associated with defæcation and constipation.<sup>1</sup>

**Constipation.** Thus constipation is often due to the habitual disregard of the call to defæcation, with the effect that the defæcation reflex is more and more blunted, leading to atony and paresis of the rectal walls. In the worst cases considerable dilatation of the rectum is produced, followed by increased constipation.

If fæcal masses remain long in the intestine or in the rectum, much of the contained liquid undergoes absorption, the fæces being converted into dry and scanty scybala. In course of time these scybala may cause obstruction and further increase the constipation, fæcal stasis being both cause and effect of fæcal stasis.

**Flatulence.** Hertz points out that intestinal flatulence may be both a cause and a result of constipation. For the muscle of a distended intestine has to contract with unusual vigour in order to maintain the usual rate of progress, and as flatulence diminishes such contractile power, constipation results, or, if already present, is aggravated.<sup>2</sup>

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<sup>1</sup> Some of the Circles associated with constipation might equally well have been placed in § IV., but for convenience sake they are all grouped together.

<sup>2</sup> Constipation and Allied Intestinal Disorders, pp. 56, 186.

**Dyschezia.** Persons suffering from a prolapsed ovary, a tender retroverted uterus, anal fissure or inflamed piles sometimes voluntarily inhibit defæcation on account of the pain involved in the act. This leads to constipation and dyschezia which may increase the primary lesion.

The reciprocal relations between the rectum and various uterine disorders is specially emphasised by Robin and Dalché :

“ Une déviation, une phlegmasie péri-utérine, une hématoçèle, une salpingite, un fibrôme, etc., produisent mécaniquement une constipation qui entraîne à sa suite tout un cortège de phénomènes dyspeptiques. . . Mais la constipation elle-même provoque des troubles dans l'utérus sain, et, par un Cercle Vicieux, aggrave dans l'utérus malade les accidents qui lui ont donné naissance.”<sup>1</sup>

**Neurasthenia.** Strumpell has drawn attention to the occasional connexion between neurasthenia and constipation :

“ The nervous affection . . . is often probably the primary disease, which is followed by constipation, while in other cases the habitual constipation leads secondarily to the nervous depression. The two conditions usually form a Vicious Circle, since each of them is able to keep up and to increase the other.”<sup>2</sup>

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<sup>1</sup> *Traitement Médical des Maladies des Femmes* (1900), p. 18.

*Textbook of Medicine*, pp. 402-3. Cf. also Gant, *Constipation and Intestinal Obstruction*, p. 132.

**Dyspepsia.** At other times dyspepsia and constipation are reciprocally correlated. Thus Hertz writes :

“ In many cases, in which dyspepsia is associated with constipation, there is a Vicious Circle at work. Owing to the anorexia produced by the constipation too little food is taken : this not only aggravates the constipation, but it also tends to produce atonic dyspepsia, both of which conditions react harmfully on each other.”<sup>1</sup>

**Prolapsus Ani.** Two Circles may be met with in prolapsus recti. Prolapse causes tenesmus : result of the tenesmus—increased prolapse. Prolapse also causes relaxation of the sphincter : result of the relaxation—increased prolapse.

**Strangulation of Piles.** At other times a different sequence is observed. Thus prolapsed piles may become strangulated and cause so much irritation as to induce spasm of the sphincter. The effect of the spasm is further to increase the strangulation.

**Oxyurides.** An illustration of an infective Circle occurs in persons whose rectum is infested with oxyurides. The consequent itching and scratching lead to the helminths or their ova being caught under the nails, conveyed to the mouth, and swallowed by the host. From the stomach the ova reach the intestines and rapidly attain maturity. Thus the irritation ensures by auto-infection successive generations of the parasite.

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<sup>1</sup> Constipation and Allied Intestinal Disorders, p. 182. Some rarer correlations are mentioned on pp. 131, 167, 168, 177, 250.

Enough has been said to indicate the frequency of Vicious Circles in disorders of the digestive system. The list, however, is far from exhausted, for disorders of digestion are so closely and reciprocally associated with other disorders of the body that disturbance of the equilibrium existing between them radiates far and wide, cause and effect reacting continuously on each other.

The study of these correlations throws fresh light on the famous aphorism of Hippocrates :

Συμπαθέα πάντα· κατὰ μὲν οὐλομελίην πάντα,  
κάτα μέρος δὲ τὰ ἐν ἐκάστῳ μέρει μέρεια πρὸς  
τὸ ἔργον.<sup>1</sup>



<sup>1</sup> "The whole body sympathises with every member, and every member with the whole, throughout its structure."



## Chapter Six.

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### Circles associated with the Urinary System.



THE Circles associated with the urinary system (Fig. V.) are of great interest owing to their number and variety.

Illustrations of the organic, mechanical, neurotic and chemical forms may be found in abundance, many of them possessing much clinical importance.

- I. Circles associated with the Kidneys.
- II. Circles associated with the Ureters.
- III. Circles associated with the Bladder and Prostate.
- IV. Circles associated with the Urethra.

#### I.—CIRCLES ASSOCIATED WITH THE KIDNEYS.

The reciprocal correlations existing between the kidneys and their fellow-organs are so intimate that it is no wonder that Vicious Circles are readily established when disease attacks the system.

**Renal Inadequacy.** When the blood is unduly charged with deleterious matters it impairs the nutrition and efficiency of the renal epithelium. Impaired nutrition and efficiency in turn keep the blood impure and complete the Circle, which is indeed frequently a cause of death, in spite of everything that Medicine can do. *Non est in medico semper relevetur ut aeger.*

Adami thus describes the condition :

“ Functional inadequacy of the kidneys is not without its effect upon the composition of the blood. The quantity of water eliminated may deviate considerably from the normal, and waste products may be retained instead of excreted. The quality of the blood is thus depreciated, and, being laden with toxic substances, it in turn exerts an irritating and deteriorating effect upon the kidneys. In this way a Vicious Circle is set up, as a result of which the condition of the patient goes rapidly from bad to worse.” <sup>1</sup>

Similar correlations involve the nervous, the digestive and the vascular systems. Thus the retention of toxic matters that should be eliminated by the kidneys injuriously affects the nervous system, and such disorder in turn increases the renal inadequacy. Or a lowered activity of the nervous system may be the primary factor, and induce a sluggish condition of the kidneys and other excretory organs, with a further reaction on the nervous tissues. The digestive system may be affected in much the same way.

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<sup>1</sup> Principles of Pathology, Vol. II., p. 735.

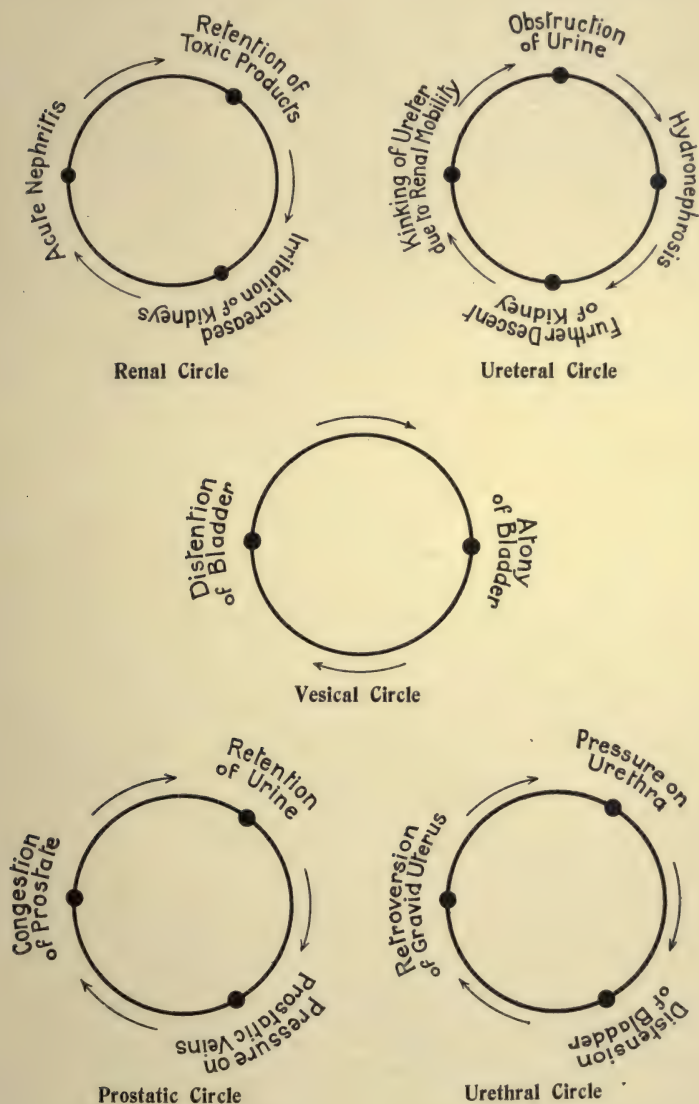


Fig. V. Circles associated with the Urinary System.

**Cardiac Disease.** Again, in cardiac disease the kidneys may be gravely involved, and "the conditions form a Vicious Circle," as Lauder Brunton points out :

"The disordered circulation disturbs the functions of other organs, and these in turn make the circulation worse. . . The disordered circulation interferes with the functions of the lungs, liver, stomach, intestines, and kidneys. On account of the difficulty of breathing, exercise becomes impossible, and thus all the accessory aids to circulation given by the muscles and fasciæ during movement are done away with. Appetite becomes lessened and flatulence increases ; the elimination of waste products by the kidneys is interfered with, and distention of the abdomen either by flatulence alone or by flatulence with ascites, presses the diaphragm up, encroaches upon the breathing space in the lungs, and tilts the heart up, thus still further increasing its difficulties." <sup>1</sup>

**Arterio-Sclerosis.** Chronic renal disease associated with arterio-sclerosis is frequently complicated by a Circle, although the exact part played by the kidneys cannot as yet be accurately defined. Modern pathologists regard arterio-sclerosis as a wide-spread process affecting both the renal organs and the arterio-capillary system generally, causing increased resistance to the flow of blood, and compensatory hypertrophy of the left ventricle followed by increased arterio-sclerosis.

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<sup>1</sup> Therapeutics of the Circulation, p. 129.



**Mott thus describes the process :**

“ Arterio-sclerosis affecting a number of vessels must lead to an increase of arterial pressure, which, reacting on the heart, causes hypertrophy ; the two are progressively reciprocal, and although the cardiac hypertrophy is a necessary physiological compensation to overcome the increasing peripheral resistance, yet the high arterial pressure which it engenders leads to an increasing strain upon the walls of the aorta and arterio-capillary system generally. The arterial lesion may then be both the cause and effect of the hypertension.” <sup>1</sup>

**As Oliver expresses it :**

“ It is not improbable that, in the manner of a Vicious Circle, a persistent rise of the arterial pressure may perpetuate itself.” <sup>2</sup>

**In some cases of nephritis there is reason for thinking that destructive changes in the renal epithelium cause an excess of an internal secretion from the kidneys (renin) to be cast into the circulation and in turn to damage the renal tissues. Chauffard and Læderich write as follows :**

“ Quoi qu’il en soit, il n’est pas douteux que les altérations des cellules rénales peuvent être l’origine de substances toxiques, qui vont contribuer à entretenir ces altérations et créer à proprement parler un Cercle Vicieux, dont la résultante sera une prolongation plus ou moins indéfinie de la néphrite.” <sup>3</sup>

**Uræmia. A similar explanation may apply to uræmia. Thus Garrod, in discussing the theories of that disease, says :**

“ It has been suggested that the tendency to chronicity in renal diseases is due to the establishment of a Vicious Circle. and that the nephrolysins formed as a result of the renal lesions aggravate the morbid condition of the kidneys.” <sup>4</sup>

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<sup>1</sup> Allbutt and Rolleston, System of Medicine, Vol. VI., p. 606.

<sup>2</sup> Studies in Blood Pressure, p. 165.

<sup>3</sup> Brouardel et Gilbert, Maladies des Reins, p. 166.

<sup>4</sup> Osler and Macrae, System of Medicine, Vol. VI., p. 90.

**Cirrhosis.** Hare attributes the thirst that is associated with renal cirrhosis to increased diuresis, "a distinctly appreciable and highly Vicious Circle" being in operation :

"The Circle comprises continuous vaso-constriction : deficiency of water in the tissues : thirst : increased ingestion of water ; and increased diuresis. The water drunk does not adequately relieve the thirst, since it fails, on account of the peripheral vaso-constriction, to flush adequately the tissues and thus to remove the essential cause of the thirst : in other words, the water drunk is largely short-circuited through the kidneys."<sup>1</sup>

**Hydronephrosis.** Shattock describes a Circle in which hydronephrosis and polyuria are associated with idiopathic dilatation of the bladder, the obstruction arising not from organic changes but from disordered innervation. After discussing alternative theories he says :

"Far more probably the polyuria results from the hydronephrosis, and there being a persistent obstruction a Vicious Circle arises, in which the hydronephrosis brings about polyuria and the resulting polyuria brings about a further increase in the hydronephrosis."<sup>2</sup>

**Movable Kidney.** In neurasthenic women a Vicious Circle may be established by a movable or floating kidney. The over-sensitive nervous system renders the sufferer unduly conscious of the abnormal mobility, while the persistent ache keeps the nervous system susceptible and further disturbs

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<sup>1</sup> Food Factor in Disease, Vol. II., p. 332.

<sup>2</sup> *Proc. Roy. Soc. Med.*, 1909, Part III. (*Pathology*), p. 97.

it.<sup>1</sup> Osler thus expresses the idea : " It is well never to tell a patient that a kidney is movable ; the symptoms may date from a knowledge of the existence of the condition."

**Renal Calculus.** Reciprocal conditions may be established in connexion with renal calculi, which are believed to originate with the deposition in the urinary passages of some colloid or albuminous matter such as mucus, pus, blood or albumen. Within the meshes of this organic framework uric acid (or other substance) is entangled; and agglutinated into a nucleus, with consequent irritation of the lining membranes. The irritation leads to further exudation of the colloid substance, and this in turn attracts fresh deposits and causes fresh irritation. And so the process continues, while the stone gradually increases in size. Secondary renal calculi, on the other hand, result from an infective process in the kidney, generally associated with stagnation of the urine. Under such conditions phosphates are readily precipitated, the resulting concretion forming the nucleus of a calculus. This nucleus in turn causes irritation of the mucous membrane and the exudation of muco-pus, and this readily gathers about itself fresh phosphates.

**Retention of Urine.** An accumulation of urine in the bladder, if at all considerable, may affect the renal secretion, as a result partly of reflex action,

<sup>1</sup> Allbutt and Rolleston, System of Medicine, Vol. VIII., pp. 777-8.



partly of mechanical tension. The accumulation of urine increases the renal secretion, which increase in turn aggravates the accumulation.

**Ascites.** In severe cases of ascites a mechanical Circle is sometimes formed, as Romberg has pointed out :

“ Ascites may obstruct the escape of blood through the renal veins, and by thus retarding the circulation through the kidneys may diminish diuresis. An important Circulus Vitiosus may be established in this way, unless the oedema and transudations can be got rid of.”<sup>1</sup>

**Dropsy** also excites thirst, the gratification of which may increase the dropsy. In the words of Horace :  
“ *Crescit indulgens sibi dirus hydrops.*”<sup>2</sup>

## II.—CIRCLES ASSOCIATED WITH THE URETERS.

**Kinking of Ureter.** Both in hydronephrosis and in pyonephrosis the ureter may be involved in the reciprocally progressive conditions. An example occurs where undue mobility of the kidney is accompanied by twisting or kinking of the ureter, causing some obstruction to the escape of urine. As the renal pelvis and calyces become distended, the whole kidney increases in size and weight, and descends further in the abdomen, thereby aggravating the kink or twist and completing the Circle.

<sup>1</sup> Krankheiten des Herzens und der Blutgefäße, p. 282.

<sup>2</sup> Odes, II., 2.



**Abnormal Insertion.** The insertion of the ureter into the hilum may be so high as to leave a pouch lying below the point of insertion and always full of urine. Cases are on record in which a pouch of this kind compressed the ureter, causing further distension and further compression. Valvular folds and other abnormalities may also at times lead to reciprocal reactions. Or the opening of the ureter into the bladder may be abnormally small, impeding the flow of urine, and giving rise to a sacciform dilatation. This dilatation may in turn further diminish the opening, and thus complete the Circle.

**Calculus in Ureter.** Again, a renal calculus in its progress towards the bladder may lodge in and block the ureter, leading to inflammation of the mucous lining. This may aggravate the obstruction, and, owing to stagnation of urine, cause an increase in the size of the stone.

**Obstruction of Ureter.** Matthews Duncan draws attention to a curious condition in which obstruction of the ureters due to polyuria provokes frequent micturition, this in its turn intensifying the obstruction :

“Frequent urination leads to obstruction of the ureters at their vesical orifices, and partial obstruction of the ureters leads to excessive secretion ; the excessive secretion requires frequent emptying ; the frequent emptying produces obstruction of the ureters ; and the obstruction of the ureters leads to excessive secretion, and so on.”<sup>1</sup>

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<sup>1</sup> Clinical Lectures on the Diseases of Women, p. 83.

### III.—CIRCLES ASSOCIATED WITH THE BLADDER AND PROSTATE.

**Prostatic Retention.** A striking example is presented by retention of urine caused by prostatic hypertrophy. The venous plexuses surrounding the prostate are always of ample size and undergo further dilatation in elderly men. This explains how it is that when, from some cause or other, congestion of the prostate takes place, very considerable swelling of the gland results, sufficient in many cases to cause complete retention. The accumulated urine in turn aggravates the venous engorgement, these two factors acting reciprocally on each other.

Desnos and Minet thus describe the mechanism of retention due to prostatic congestion :

“ On comprend dès lors comment la rétention s'opère : le volume des lobes latéraux augmentant brusquement les amène au contact ; toute la glande elle-même est comprimée par les plexus périprostatiques : enfin et surtout la muqueuse congestionnée et œdématiée vient faire un bourrelet qui obstrue le col de la vessie ; la muqueuse, plus friable, saigne au moindre contact d'une sonde. Pendant ce temps, l'urine s'accumule en arrière de ce bourrelet, distend la vessie. La pression du liquide dans ce réservoir augmente encore la stase veineuse, et l'oblitération cervicale devient invincible.”<sup>1</sup>

In other cases the voluntary retention of urine is the primary link in the Circle. Dr. J. L. Joyce has observed a marked diminution in the size of the

<sup>1</sup> *Maladies des Voies Urinaires*, 1909, p. 411 ; cf. also Guyon, *Leçons Cliniques sur les Maladies des Voies Urinaires*, Vol. II., p. 397, *et seq.*

prostate as soon as the bladder had been evacuated by catheterisation.

**Residual Urine.** Another Circle may be caused by the retention in the bladder of residual urine occupying the region of the trigone. This residual urine often sets up vesical irritation and congestion, which aggravate each other. Thus Mansell Moullin writes :

“The presence of residual urine and the straining and effort caused by the disadvantage at which the muscular coat of the bladder is placed do not allow the congestion to subside. A Vicious Circle is established, the irritability causing increased frequency, and the increased frequency making the congestion and irritability worse.”<sup>1</sup>

Again, the muscular wall of the trigone is apt gradually to yield under the continual pressure, giving rise to a thin-walled post-prostatic pouch. When once formed, this pouch leads to further retention of urine, and this in turn to further bulging. Occasionally the pouch has attained such dimensions as to reach the perineum. In women a cystocele may be formed in much the same way.

In some forms of prostatic hypertrophy the enlarged lobe takes the shape of a valve which falls over and closes the vesical orifice as soon as the bladder begins to contract. The more vigorous the contraction, the more tightly is the orifice closed ; the tighter the closure the greater the contraction.

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<sup>1</sup> Enlargement of the Prostate, p. 127.



**Cystitis.** Sir Henry Thompson draws attention to a Circle that is frequently present when catheterism, although imperatively demanded by an incapable and inflamed bladder, aggravates the inflammation :

“ The cystitis on the one hand, and the catheterism on the other, exercise mutually inimical influences, and the patient becomes the victim of a Vicious Circle of actions, in which an absolutely indispensable remedy, the catheter, aggravates the inflammation of the bladder, which therefore, in its turn, demands the instrument with increasing frequency.” <sup>1</sup>

**Atony of Bladder.** Where retention has led to atony of the bladder, another reciprocal condition is set up, as pointed out in Keen and Da Costa's *Surgery* :

“ Prolonged or repeated retention, with overstretching of the organ, from any cause whatever, results in weakening of the detrusor muscles, reducing their contractibility and producing the condition called atony ; while, on the other hand, atony itself contributes to further retention by reason of the inability of the weakened muscles to expel the urine. Thus is established a Vicious Circle that forms the intimate relation between the two conditions.” <sup>2</sup>

**Lithotrity.** Guyon draws attention to correlations that were common in earlier days when lithotrity was prolonged over several sittings. The cystitis called

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<sup>1</sup> Clinical Lectures on Diseases of the Urinary Organs, p. 147.

<sup>2</sup> Vol. IV., p. 299



for lithotritry, while the resulting fragments of crushed stone increased the cystitis :

“ Autrefois lorsqu'on avait recours aux séances courtes et multiples sans chloroforme, . . . on abandonnait dans la vessie les débris de la pierre qu'on avait broyée. Ces débris plus ou moins anguleux étaient parfois d'un volume assez considérable. Aussi, à l'irritation que provoquaient directement les manœuvres et que n'atténuait aucune tentative d'anesthésie, s'ajoutait bientôt celle du contact de ces fragments, contact beaucoup plus offensif, on le conçoit, que ne l'était auparavant celui du calcul tout entier. Ainsi se produisaient des poussées de cystite d'autant plus difficiles à prévenir et à combattre qu'elles étaient précisément provoquées par le véritable traitement curateur, et que ce traitement exigeait toujours un nombre plus ou moins considérable de séances. On était donc inévitablement condamné à tourner dans un Cercle Vicieux.”<sup>1</sup>

**Prostatitis.** Fürbringer describes a Vicious Circle present in acute prostatitis, the abdominal straining to pass water increasing the pressure on the urinary tract, and thus leading to a greater obstruction and straining :

“ The violent contractions of the abdominal muscles provoked by the dysuria exert an injurious pressure on the inflamed gland, which in its turn further compresses the urethra, and thereby adds to the sufferings due to the dysuria. As a result of this Circulus Vitiosus the patient may be brought into a state almost of despair.”<sup>2</sup>

**Vesical Calculus.** Some interesting reciprocal relations are established during the growth of a vesical calculus, whether such calculus has descended from the kidney or was primarily formed in the bladder. If a small nucleus slips into a healthy bladder, just enough irritation may be provoked to cause the calculus to be surrounded with an envelope

<sup>1</sup> La Vessie et la Prostate, p. 699.

<sup>2</sup> Die Krankheiten der Harn- und Geschlechtsorgane, p. 313.

of mucus in which successive layers of crystals are deposited. The growth of the stone then proceeds in an acid medium, the film of colloid being ever ready to attract fresh crystals of uric acid, or other substance, from the urine by molecular coalescence, while the enlarging stone keeps up the irritation and causes more and more mucus to be secreted.

Sooner or later, however, bacterial infection generally ensues, leading to cystitis and the precipitation of phosphates. The film of mucus then becomes a nidus for the deposit of phosphatic accretions, and the growth of the calculus proceeds in an alkaline medium. The growing calculus increases the irritation, while the irritation leads to further deposits of phosphates thus adding to the size of the concretion. A very similar Vicious Circle of events is present when the concretion is *ab origine* a vesical one, resulting from the deposition of phosphates.

Where bacterial infection supervenes in connexion with a calculus or otherwise a further Circle is established, since the micro-organisms provoke ammoniacal fermentation and increased cystitis. Fresh pabulum is thus supplied to the invaders, adding to their powers of multiplication. Moreover, the alkaline salts formed during cystitis constitute a further source of irritation, as Skene points out :

“ The irritant effect of these salts, really deposits of foreign bodies, on the inflamed mucous membrane completes the Vicious Circle, the effect now aiding the original cause.”<sup>1</sup>

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<sup>1</sup> Pepper and Starr, System of Practical Medicine, Vol. IV., p. 341.

**Irritable Bladder.** A neurotic Circle is occasionally met with in which impaired tone results from and also produces an irritable bladder. Reginald Harrison speaks of persons who, in view of an imaginary inconvenience they may be temporarily exposed to during a long railway journey, go on for days previously micturating every few minutes. They thus acquire a habit which becomes established.<sup>1</sup>

A somewhat similar neurosis due to exaggerated reflex irritability is met with in nocturnal enuresis. Some temporary derangement sets up nocturnal incontinence, and this, if frequently repeated, may so act on the impressionable nervous system of a child as to form a habit which may persist even after the removal of the exciting cause. Many such habit Circles are met with in Medicine.

#### IV.—CIRCLES ASSOCIATED WITH THE URETHRA.

**Retention of Urine.** The obstetrician meets with a Circle caused by a retroverted gravid uterus pressing on the urethra, and thus leading to retention of urine and increased retroversion. At other times the retention of urine is the primary and the retro-

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<sup>1</sup> Lectures on the Surgical Disorders of the Urinary Organs, p. 191.



version the secondary factor. Pouliot thus describes the condition :

“ La rétroversion, une fois constituée, apporte un obstacle à l'émission de l'urine si bien que dans la majeure partie des cas un Cercle Vicieux se trouve formé. La vessie en ne se vidant point, projette l'utérus en arrière ; celui-ci se prolabant dans le cul-de-sac de Douglas s'oppose à la miction, et seule une évacuation artificielle de la vessie peut mettre un terme aux accidents.”<sup>1</sup>

**Congestion of Urethra.** In acute gonorrhœa the urethral mucous membrane may be so inflamed as to lead to retention of urine. Such retention in turn aggravates the congestion of the lower urinary tract and increases the urethral obstruction. The more prolonged the retention the greater the swelling of the mucous membrane, and *vice versa*. The severe straining associated with tight strictures and with retention sets up a similar hyperæmic condition of the urethra and aggravates the stricture.

**Stricture of Urethra.** Again, with congenital or other strictures of the urethra it is not uncommon to find extensive retro-strictural dilatations. These dilatations contain decomposing urine, and sometimes a calculus, and may be so situated as to press further on the strictured urethra, or to provoke dysuria. Thus the dysuria is both cause and result of the dilatation.

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<sup>1</sup> *Annales des Maladies Génito-Urinaires*, 1909, p. 5.



## Chapter Seven.

### Circles associated with the Sexual System.



THE intimate correlations that exist between different portions of the sexual system, as well as between the sexual and the other great systems of the body, would on *a priori* grounds lead us to expect the creation of numerous Circles when disease invades the sexual organs. Such in fact is the case (Fig. VI.).

The two sexes will be dealt with separately.

#### I.—CIRCLES ASSOCIATED WITH DISORDERS IN THE MALE.

**Masturbation.** A common example is presented by neurasthenia associated with sexual malpractices. Oppenheim writes thus :

“ A Circulus Vitiosus is frequently established under such circumstances ; for the propensity to masturbation is in itself a symptom of neuropathic tendencies, while on the other hand masturbation gives birth to a host of nervous disorders.”<sup>1</sup>

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<sup>1</sup> Lehrbuch der Nervenkrankheiten, 1908, Vol. II., pp. 1285-7.

**Müller also describes the Circle :**

“ In neurasthenic persons of both sexes, especially if unmarried, there is a tendency to satisfy the sexual instinct by means of masturbation. Indeed it is often difficult to decide whether the masturbation should be regarded as a result or as a cause of the sexual neurasthenia, since a *Circulus Vitiosus* has generally been established.” <sup>1</sup>

**Another common Circle is associated with sexual vice, which begets a craving for excessive indulgence.**

**Posterior Urethritis.** Fürbringer draws attention to the close connection between congressus interruptus and posterior urethritis, with which spermatorrhœa is often associated, the two aggravating each other. Speaking of congressus interruptus he says :

“ A condition of spermatorrhœa or of too facile pollution is almost invariably provoked ; moreover in addition to the sexual neurasthenia a chronic state of irritability of the posterior urethra is brought on, which gives rise to a *Circulus Vitiosus*.” <sup>2</sup>

**Sturgis lays emphasis on the same Circle :**

“ There is a constant hankering for more intercourse. This inordinate desire gives rise to more frequent copulation, until hyperæsthesia is set up in the prostatic urethra, which is sought to be relieved by more coitus, and thus a Vicious Circle is established ; the more the patient copulates the more the irritation, and the greater the irritation the more the desire for coition.” <sup>3</sup>

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<sup>1</sup> Neurasthenie, p. 181.

<sup>2</sup> Störungen der Geschlechtsfunctionen des Mannes, p. 41.

<sup>3</sup> Prostatorrhœa Simplex and Urethrorrhœa ex Libidine, *J. of Cut. and Genito-Urinary Diseases*, New York, 1898, Vol. XVI., p. 270.

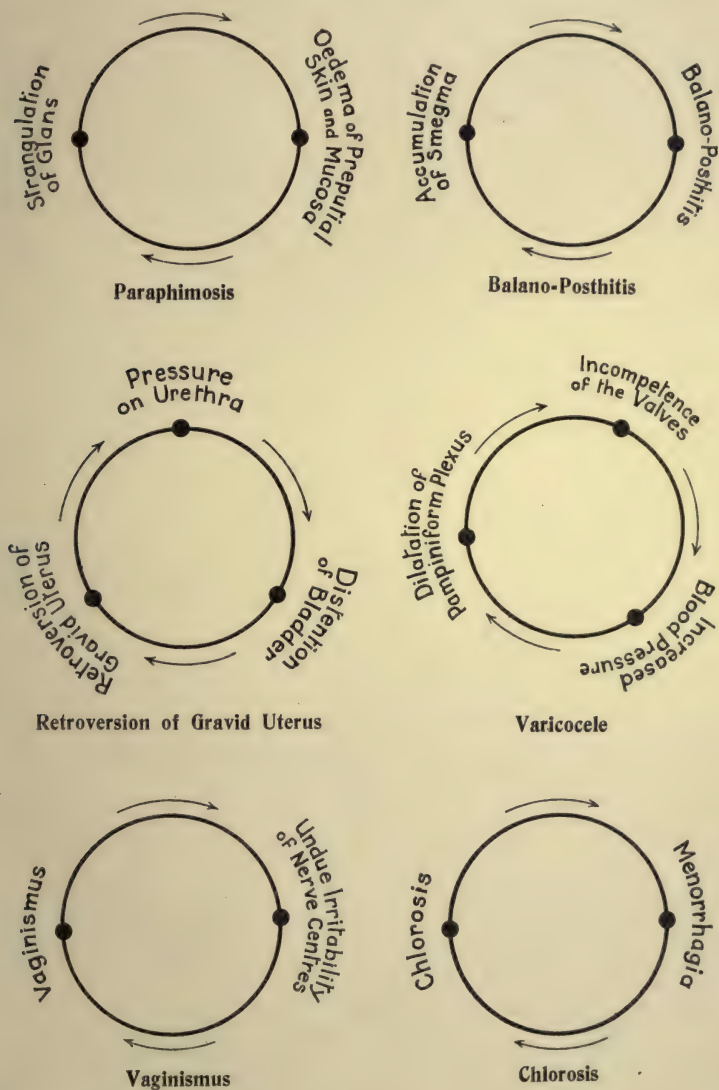


Fig. VI. Circles associated with the Sexual System.

**Spermatorrhœa.** Spermatorrhœa may form a factor in a morbid chain of events, quite apart from sexual malpractices. Thus Beard writes :

“Occasional seminal discharges in the healthy and unmarried are physiological—that is, they are not symptoms of disease. Such involuntary discharges, when excessively frequent, may be both results and causes of disease, indicating an abnormal, usually an exhausted state of the nervous system, and in turn reacting on the nervous system, increasing the very exhaustion that caused it.”<sup>1</sup>

Such frequent pollutions are often met with during convalescence from typhoid, acute rheumatism or pneumonia. They are then due to the exhausted state of the nervous system and help further to exhaust it.<sup>2</sup>

**Hyperæsthesia of Urethra.** Any condition of irritation along the genital tract, whether of gonorrhœal origin or not, may establish reciprocal relations between that tract and the erection and ejaculation centres. Peripheral irritation renders the sexual centres unduly sensitive and excitable, while these latter in turn increase the hyperæsthesia of the

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<sup>1</sup> Nervous Exhaustion, p. 70.

<sup>2</sup> Löwenfeld, Neurasthenie und Hysterie, p. 79.



urethra, especially of its prostatic and bulbous sections :

"It must always be borne in mind that any peripheral irritation in the sexual tract of the male, whatever the cause, . . . reacts on the ejaculation centre and induces a chronic state of increased irritability. This condition of irritability also spreads to the erection centre which is, both anatomically and functionally, so closely connected with the ejaculation centre. A *Circulus Vitiosus* is thus established, since the abnormal stimulation of the erection centre gives rise in its turn to peripheral hyperæmia and irritation, sometimes even to ejaculation, which again reacts injuriously on the centres."<sup>1</sup>

**Impotence.** A common example of a Circle is associated with impotence, as pointed out by Morris :

"Some slight physical imperfection or want of general tone may give rise to a feeling or fear of impotence or of mistrust of self, or an exaggerated idea of the effects of past masturbation, or the memory of an unsatisfactory coitus may take possession of the mind, and an imaginary or false impotence will be the result. The mere thought that a sexual intercourse will be impossible or unsatisfactory is quite sufficient cause to make it so."<sup>2</sup>

**Urethritis.** Some reciprocal relations are established in cases of retention of urine due to hyperæmia and swelling of the urethral mucous membrane in gonorrhœa. The swelling may at first merely impede the escape of urine. But as soon as retention is produced, the accumulated urine causes increased venous congestion of the urinary tract, and thus by aggravating the swelling completes the Circle.

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<sup>1</sup> Nothnagel, *Specielle Pathologie und Therapie*. Nervosität und Neurasthenische Zustände, by Krafft-Ebing, p. 191.

<sup>2</sup> *Injuries and Diseases of the Genital and Urinary Organs*, p. 43.

**Paraphimosis.** A mechanical Circle may complicate paraphimosis, when the constricting preputial skin and mucous membrane lead to engorgement of the glans, and this engorgement causes the ring to grow tighter and tighter. In other words the strangulation leads to congestion, and this in turn aggravates the strangulation.

**Balano-Posthitis.** Corner points out a Circle that is established when through want of cleanliness the smegma under the prepuce is allowed to collect and decompose. Especially is this likely to happen where the preputial orifice is narrow :

“ The secretion decomposes and irritates both the glans penis and the prepuce, producing a chronic superficial balano-posthitis and a deeper chronic inflammation in the prepuce, causing its fibrosis and subsequent contraction on the glans penis. The meatus in it also becomes contracted so that it can no longer be withdrawn over the glans, and the secretions under it collect and ferment, producing further irritation. The greater the irritation of the glands by decomposing secretion, the greater the amount of secretion they produce. In this way a Vicious Circle is established.”<sup>1</sup>

The phimosis causes retention of the smegma ; the retention sets up balano-posthitis and aggravates the phimosis.

**Varicocele.** In cases of varicocele the tortuous and dependent veins of the pampiniform plexus are enlarged, while the valves become incompetent and their walls thinned, thus giving rise to a condition that perpetuates itself. The larger the veins the greater the tension on their walls ; the greater the

<sup>1</sup> Male Diseases in General Practice, p. 398.

tension the more do the walls yield. When once the valves become incompetent, a further aggravating factor is superadded.

**Hydrocele.** Hydrocele is another disorder in which morbid correlations may be established. Its main cause lies in a disturbance of the equilibrium between the fluid secreted into, and absorbed from, the tunica vaginalis, as a result of traumatism or orchitis. When the quantity of fluid secreted is increased, such increase may compress the effluent lymphatics and so lead to a further accumulation, much as occurs with a pleuritic effusion.

Or again the spermatic artery may, owing to arterio-sclerosis, be unequal to the task of driving the blood through the veins. Hence may result a venous congestion of the testicle and from time to time a hydrocele, leading in turn to further congestion.

## II.—CIRCLES ASSOCIATED WITH DISORDERS IN THE FEMALE.

Owing to the greater sensitiveness of the nervous system in women, reciprocal relations between a local disorder and the general health are more frequent than in the male. Thus Thomas writes :

“ It should not be forgotten by the gynæcologist that chronic local disease is often caused by a general depreciation of the system. . . . When such a result takes place the two states continue to react one upon the other. The depraved system increases the local disorder to which it has given rise, and the irritation, kept up by the latter, aggravates the degree of the former.”<sup>1</sup>

<sup>1</sup> Diseases of Women, p. 56.



**Amand Routh refers to the same condition :**

"We have frequently to deal with a Vicious Circle, with local and constitutional states so interacting, that no real improvement is possible until both the general and local states receive their due share of attention."<sup>1</sup>

**Ovarian Hyperæsthesia.** Ovarian hyperæsthesia may be mentioned as a specific example. Thus Herman, describing chronic ovarian pain, says :

"In chronic pelvic pain with neurasthenia effects follow one another in a Vicious Circle. The patient feels more severely the pelvic pain because her nervous system is too sensitive. The persistent pelvic pain keeps her nervous system weak and sensitive and further weakens it."<sup>2</sup>

**The ovarian hyperæsthesia is frequently aggravated during the menstrual nîsus :**

"Even when uncomplicated, prolonged hyperæmia may result in acute oophoritis or more often in chronic disease of the ovaries, which completes the Vicious Circle by increasing in its turn the periodical congestion which originally led to it."<sup>3</sup>

**Nervous Exhaustion.** Another form of chronic ovarian pain is common soon after childbirth, especially in a woman who has borne children quickly:

"These symptoms are those of nervous exhaustion produced by the strain on the nervous energy of pregnancy, labour, and suckling, together with the worry and disturbed rest which the care of a young family involves. The morbid states form a Vicious Circle. Want of sleep exhausts the nervous system, and nervous exhaustion prevents sound sleep. Weakness of digestion due to nervous exhaustion impairs nutrition, and the discomfort after food helps to prevent sleep. The nervous exhaustion causes the pain, and the pain, in its turn, aggravates the nervous exhaustion, partly by the direct effect of the pain, partly because it suggests to the patient fear of worse evils to come."<sup>4</sup>

<sup>1</sup> Allbutt, Playfair and Eden, *Gynæcology*, p. 737.

<sup>2</sup> *Diseases of Women* (1907), p. 86; *British Med. J.*, 1910, Vol. I.,

<sup>3</sup> Mann, *System of Gynæcology*, Vol. II., p. 857. [p. 183.]

<sup>4</sup> Herman, *Diseases of Women*, p. 79.



**Uterine Disorders.** Similar reciprocal relations may be established by uterine or vaginal disorders such as metritis, leucorrhœa and dysmenorrhœa, all of which depreciate the general health, which depreciation in turn reacts on the local disorder :

“ Les altérations de l'estomac évoluent souvent en même temps qu'une lésion de l'utérus ; les deux affections marchent parallèlement, elles retentissent l'une sur l'autre ; c'est un Cercle Vicieux, et vous aurez beau curetter la cavité de la matrice, et traiter la métrite par tous les moyens ; si vous bornez là votre thérapeutique, vous échouerez ou vous n'obtiendrez qu'un succès temporaire.”<sup>1</sup>

In other cases the nervous or psychical condition suffers. For in the female even more than in the male do the bodily functions influence the mind, and *vice versa*, so that a Vicious Circle is produced.

**Chlorosis.** Chlorosis, although usually a cause of scanty menstruation, at times leads to menorrhagia and metrorrhagia, which in turn aggravate the chlorosis. Matthews Duncan thus writes :

“ When a woman is chlorotic she fortunately has generally amenorrhœa, but if not, she will be very likely to have menorrhagia. And you have here an illustration of a Vicious pathological Circle. The menorrhagia increases the chlorosis, and, *vice versa*, the chlorosis aggravates the menorrhagia.”<sup>2</sup>

<sup>1</sup> Robin and Dalché, *Traitement Médical des Maladies des Femmes*, 1900, p. 27.

<sup>2</sup> *Lectures on the Diseases of Women*, p. 124.

It is difficult to explain the menorrhagia when the body can so ill spare the loss of blood. Possibly the cause may be found in the low specific gravity or coagulability of the blood or in a faulty nutrition of the capillaries. Croom writes in the same strain :

“ These cases are amongst the most difficult to treat, because they interact in such a way as to produce a Vicious pathological Circle—the drain on the system by the hæmorrhage tending to aggravate the very systemic condition which, in its turn, leads to the menorrhagia.” <sup>1</sup>

**Pruritus Vulvæ.** A troublesome Circle may be set up by pruritus vulvæ. The irritation may be purely nervous in origin, but it is more often due to some local disease. As Goodell observes : “ The itching compels scratching ; the scratching abrades the skin and intensifies the itching.” <sup>2</sup>

Similarly Thomas writes :

“ The disease and the remedy which instinct suggests react upon one another, the first requiring the second, and the second aggravating the first, until a most rebellious and deplorable condition is developed.” <sup>3</sup>

At times the irritation is so severe as to induce sleepless nights which aggravate the neurosis. Similar effects may result from vulvitis associated with vaginal discharges, the consequent irritation and rubbing reciprocally provoking each other.

<sup>1</sup> Allbutt, Playfair and Eden, Gynæcology, p. 85.

<sup>2</sup> Goodell, Lessons in Gynæcology, p. 91.

<sup>3</sup> Diseases of Women, p. 144.

**Vulvitis.** A Circle similar to that described above in connection with balano-posthitis may occur in the female. If the smegma secreted by the vulvar glands is allowed to accumulate until it undergoes decomposition, inflammation and excoriation of the mucous surfaces may result, leading to increased secretion and accumulation.

**Hypertrophy of Clitoris.** Dudley draws attention to a Circle present in persons in whom the clitoris is enlarged and surrounded by redundant preputial skin. The hypertrophied skin exposes the clitoris and prepuce to friction, and thus gives rise to irritation, scratching and masturbation. This, in turn, leads to congestion and further enlargement of the clitoris and prepuce, thus completing the Circle.<sup>1</sup>

**Vaginismus.** Vaginismus may be due to great nervous excitability of the woman or to local hyper-æsthesia. In any case these conditions act and react on each other, as Robin and Dalché point out :

“ Que l'état général soit la cause ou l'effet des accidents génitaux, peu importe, par un Cercle Vicieux ils retentissent les uns sur les autres et s'aggravent. La thérapeutique doit viser, non seulement le système nerveux, mais les phénomènes dyspeptiques, les troubles de ptose viscérale, l'anémie, en un mot l'équilibre de l'organisme entier, pour rendre plus efficaces et d'un effet plus durable les soins locaux dirigés contre l'irritation vulvaire.”<sup>2</sup>

<sup>1</sup> Gynæcology, p. 526.

<sup>2</sup> Traitement Médical des Maladies des Femmes, 1900, p. 284.

**Displacement of Uterus.** Several Circles may be established in connection with uterine displacements, especially when, as so often happens, some inflammation is also present :

“ These inflammations are sometimes the cause, sometimes the consequence of the displacement ; in either case the displacement and inflammation tend to perpetuate and to aggravate each other.”<sup>1</sup>

For example, a woman with a perfectly normal uterus who has been compelled to carry heavy weights may suffer from prolapse owing to excessive pressure forcing down the uterus.

“ But this remains the sole cause for a short time only. Very soon increased weight of the uterus from congestion, enfeeblement of uterine supports from prolonged tension, and traction by falling of the hypertrophied vagina and prolapsed bladder complete the Vicious Circle.”<sup>2</sup>

Especially is this the case with procidentia, since the veins of the broad ligaments are so narrowed as to greatly interfere with the return of blood. Thus the procidentia is both cause and result of the congestion.

**Hypertrophy of Cervix.** Goodell draws attention to reciprocal relations that may be established

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<sup>1</sup> Allbutt, Playfair and Eden, Gynæcology, p. 197.

<sup>2</sup> Thomas, Diseases of Women, p. 383.



between the uterus, vagina and bladder, especially in connection with hypertrophic elongation of the supra-vaginal portion of the cervix.

“ It is a Vicious Circle throughout : the prolapsing organ—say the vagina—tugs at the bladder, which yields, and in turn lends its weight towards the further descent of the former by alternately coercing and being coerced ; their united action at last begets the circular hypertrophy of the cervix ; the latter returns the favour by edging and nudging on the vagina, which responds by still more increasing the prolapse of the bladder and the hypertrophy of the cervix, and by aiding them in drawing out the supra-glandular portion of the cervix. Thus the reciprocation is kept up until the constantly elongating and growing cervix has attained length and weight enough to act aggressively.”<sup>1</sup>

In some cases of hypertrophy of the vaginal cervix all the symptoms of a foreign body in the vagina may be present. Like a polypus the cervix keeps up vaginal irritation and induces expulsive efforts which in turn increase the descent and hypertrophy.<sup>2</sup>

Another Circle occurs where the elongated and protruding cervix is so strangulated by the vulvar orifice that the return of blood is obstructed. The strangulation leads to œdema of the cervix and this in its turn aggravates the strangulation.

**Salpingitis.** When mucus or pus collect in the Fallopian tube, congestion and obstruction of the

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<sup>1</sup> Lessons in Gynæcology, p. 227.

<sup>2</sup> Barnes, Diseases of Women, p. 623.

ostium uterinum are liable to follow, giving rise to hydrosalpinx or pyosalpinx. If the retained secretions undergo decomposition, further irritation is set up which aggravates the obstruction.

Occasionally a kinking of the Fallopian tube is the primary cause of retention, followed by increased weight. The greater weight increases the kink, and so the process continues, while the lumen gets steadily less and the accumulation of secretion more abundant.

**Constipation.** Reciprocal relations between the uterus and the rectum are common, as Robin and Dalché point out :

“ Une déviation, une phlegmasie péri-utérine, une hématocele, une salpingite, un fibrôme, etc., produisent mécaniquement une constipation qui entraîne à sa suite tout un cortège de phénomènes dyspeptiques. . . . Mais la constipation elle-même provoque des troubles dans l'utérus sain, et, par un Cercle Vicieux, aggrave dans l'utérus malade les accidents qui lui ont donné naissance.”<sup>1</sup>

Where the uterus or the ovary is tender, considerable pain may be excited by the efforts of defæcation. Hence the woman is tempted to postpone the act, with the result of increased constipation.

**Displacement of Kidney.** Morbid correlations may also be associated with disorders of the uterus and displacements of the kidney. In the words of Robin and Dalché :

“ Nous nous trouvons en face d'un Cercle Vicieux ; . . . les deux organes réagissent l'un sur l'autre simultanément.”<sup>2</sup>

<sup>1</sup> Traitement Médical des Maladies des Femmes, 1900, p. 18.

<sup>2</sup> L.c., pp. 34, 35.

**Heart Disease.** Landau has studied the disorders induced in the vascular system by the growth of uterine myomata, and believes that a Circle may be established in such disorders :

“ The formation of varices, the occurrence of thrombosis and, finally, the onset of degeneration of the myocardium, are very common. Should the last-named process result . . . . . then, by a Vicious Circle, the uterine hæmorrhages become continually more profuse, in consequence of increasing passive hyperæmia dependent upon diminishing power of the cardiac pump. . . . In the great majority of cases, the myoma and the uterine hæmorrhages that result from its growth are the primary cause of the morbus cordis.”<sup>1</sup>

**Inversion of Uterus.** Several Circles are met with in obstetrical practice. Thus in cases of inversion of the uterus, the fundus may at first be merely indented so as to project into the uterine cavity like a polypus. This inverted portion then sets up contractions which increase the inversion, while the remainder of the process is completed by the uterus itself, which, so to speak, swallows the indented portion.

**Retroversion of Gravid Uterus.** A mechanical Circle is established when a retroverted gravid uterus is so impacted in the pelvis as to press on the urethra and cause retention of urine. The distended bladder increases the retroversion, the retroversion increases the retention.<sup>2</sup>

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<sup>1</sup> Kisch, *The Sexual Life of Woman*, tr. by Paul, p. 240.

<sup>2</sup> Matthews Duncan, *Clinical Lectures on the Diseases of Women*, p. 79.





## Chapter Eight.

### Circles associated with the Eyes and Eye-lids.



ISEASES of the eyes are frequently complicated by Vicious Circles. In some cases different portions of the visual apparatus are involved in the morbid correlation ; in other cases the visual apparatus and the general health (Fig. VII.).

The following Classification, although convenient, cannot always be strictly adhered to :

- I. Circles associated with the Eyes.
- II. Circles associated with the Eye-lids.
- III. Circles associated with Disorders of Refraction.

#### I.—CIRCLES ASSOCIATED WITH THE EYES.

**Glaucoma.** A striking example is presented by glaucoma, a disease which, in the words of Priestley Smith, “perpetuates and intensifies itself in a Vicious Circle.”<sup>1</sup>

In the healthy eye the intra-ocular fluid, after being secreted by the ciliary glands, passes into the posterior, and then into the anterior, chamber, filters through

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<sup>1</sup> Norris and Oliver, System of Diseases of the Eye, Vol. III., p. 648.

the ligamentum pectinatum and spaces of Fontana, and escapes into the canal of Schlemm and thence into the anterior ciliary veins, a state of equilibrium being maintained by the processes of secretion and absorption.

In glaucoma this equilibrium is disturbed, with the result that the intra-ocular pressure rises. The exact mechanism is, however, not fully understood, and authorities differ as to the sequence of events.

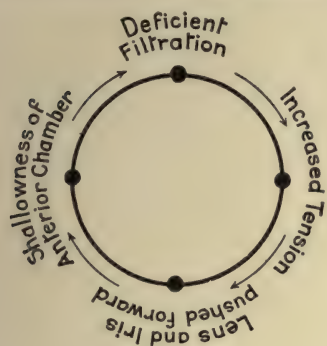
According to the popular "retention theory," the root of the iris is under certain predisposing conditions approximated to the root of the cornea, thus diminishing the angle of the anterior chamber and hindering the escape of the intra-ocular fluid, an excess of which is consequently retained. If congestion of the ciliary processes should happen to occur, the circumlental space is contracted, so that the intra-ocular fluid can no longer flow freely from the vitreous humour into the posterior chamber. It consequently accumulates in the vitreous and pushes forward the lens and iris, thus further blocking the angle of the anterior chamber and checking excretion.

Lawson thus describes the Circle :

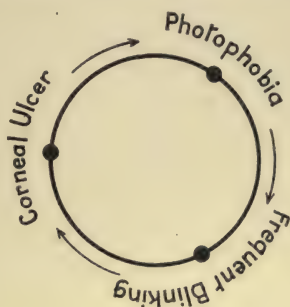
"The sudden raising of the intra-ocular pressure increases the congestion, to be followed in its turn by a serous exudation from the venous channels, with a consequent further increase of pressure ; and thus a Vicious Circle is quickly established, with symptoms of ever-increasing violence."<sup>1</sup>

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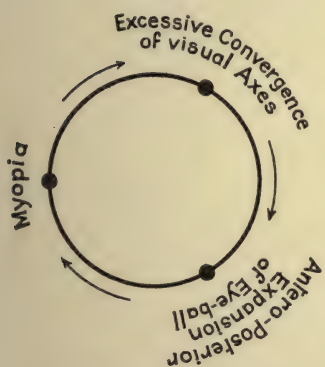
<sup>1</sup> Diseases and Injuries of the Eye, p. 236 ; cf. also Henderson, Glaucoma, 1910, p. 131.



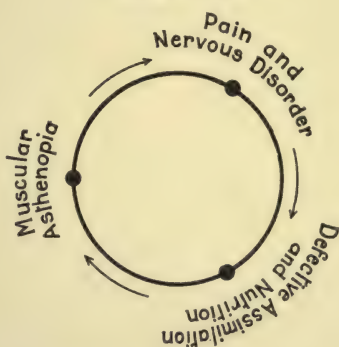
Glaucoma



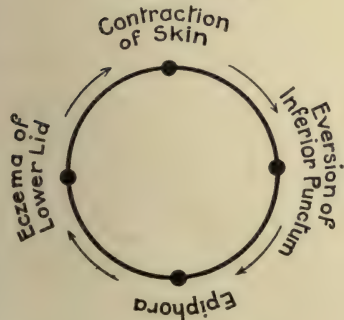
Corneal Ulcer



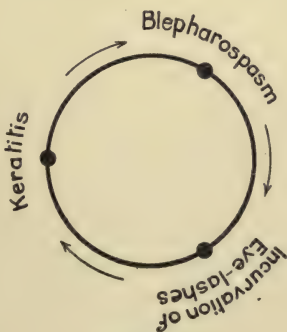
Progressive Myopia



Hypermetropic Asthenopia



Ectropion



Entropion

Fig. VII. Circles associated with the Eyes and Eye=lids.

In his recent work on glaucoma, Kuschel emphasises increased pressure in the vitreous humour as the great factor in the genesis of glaucoma, and points out the double Circle that may be established :

“ The increased pressure in the vitreous humour forces the coronary division of the hyaloid membrane (vorderer Grenzschrift) into the intervals between the ciliary folds (Ciliartäler) and thus blocks them. As a result fluid can no longer escape from the vitreous, in consequence of which a further rise in pressure takes place, followed by a further blocking of the inter-ciliary spaces. The Vicious Circle thus established leads to an enormous increase of intra-vitreous pressure and to a complete arrest of the circulation of intra-ocular fluids.”<sup>1</sup>

**And again :**

“ The increased tension in the vitreous exerts severe pressure on the choroid especially on its anterior section. . . Hence results partial or complete obstruction to the venous flow through the ciliary processes, whose veins open into the anterior venæ vorticosæ. The ciliary processes consequently become distended and encroach upon or even entirely obliterate the interciliary spaces. In this way another Vicious Circle is established which must further raise the pressure in the vitreous.”

**Secondary Glaucoma.** Reciprocal relations also occur in connection with secondary glaucoma, as, for example, where staphyloma results from perforation of the cornea associated with cicatrization of the prolapsed iris. Under such circumstances there is more or less complete obliteration of the angle of the anterior chamber followed by increased tension. This increased tension in turn aggravates the staphyloma *et ainsi de suite*.

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<sup>1</sup> Der Intra-Okulare Flüssigkeitsstrom in seinen Beziehungen zum biomechanischen Aufbau des Auges unter gesunden Verhältnissen, beim Glaukom und bei der Kurzsichtigkeit, 1910, pp. 120, 129.



The sequence of events is thus described by Fick :

“ Staphyloma corneæ is a corneal scar which, with the adherent iris, bulges outward. . . . The adhesion of the iris to the cicatrizing cornea produces traction on the ciliary body, that vascular and nervous part of the inner tunic of the eye by which the aqueous humour is secreted. Irritation of the ciliary body—so it is assumed—increases secretion ; the internal pressure of the eye is thereby raised. This heightened tension pushes the scar forward with greater force ; the ciliary body is thereby still more dragged upon, with the consequence of shutting up the Circulus Vitiosus.”<sup>1</sup>

**Keratitis.** Keratitis is not infrequently complicated by a Circle, due to the associated trichiasis and blepharospasm :

“ The corneal inflammation causes great pain with photophobia and lachrymation, owing to which the patient keeps his eyes convulsively closed (blepharospasm), and by so doing causes a still greater approximation of the incurred lashes to the cornea, and establishes a Vicious Circle.”<sup>2</sup>

Unless some efficient treatment is adopted which interrupts the morbid process, matters go from bad to worse. The cornea becomes opaque, and sight may be completely destroyed.

**Corneal Ulcer.** Another troublesome condition may be associated with ulcer of the cornea owing to the constant blinking of the upper eye-lid :

“ The movement of the upper lid, by rubbing against and irritating the ulcerated surface, increases the pain and photophobia, and in this way keeps up a Vicious Circle, which is arrested by a light bandage.”<sup>3</sup>

<sup>1</sup> Diseases of the Eye and Ophthalmoscopy, tr. by Hale, p. 257.

<sup>2</sup> Lawson, Diseases and Injuries of the Eye, p. 459.

<sup>3</sup> Lawson, L.c., p. 145.

**Foreign Body in Eye.** The presence of a foreign body in the cornea may set up reciprocal relations owing to the secondary photophobia and blepharospasm. The prolonged exclusion of light renders the retina more and more sensitive, thus provoking a condition which perpetuates the blepharospasm.

**Kerectasia.** In some forms of kerectasia resulting from inflammation, apart from perforation, the corneal tissues are so softened and thinned, as to be unable to resist the intra-ocular pressure. The consequent progressive bulging may cause further attenuation and further bulging. A similar sequence of events is sometimes associated with scleral ectasia and with keratoconus.

**Phlyctenular Conjunctivitis.** Phlyctenular conjunctivitis, so largely dependent on malnutrition and struma, is one among many disorders in which local disease reacts on the general health and *vice versa*. As a result of the extreme photophobia the affected person, usually a child, shrinks from light for weeks or months, burying the face in cushions or wherever light can best be excluded. The deprivation of fresh air and exercise lowers the already depressed nutrition and aggravates the disease.

A second Circle is frequently established when the blepharospasm keeps the lids in close contact and thus leads to retention of unhealthy discharges. Cause and effect act and react on each other.

**Gonorrhœal Ophthalmia.** Very similar reciprocal relations are associated with gonorrhœal ophthalmia or ophthalmia neonatorum. The photophobia and blepharospasm cause the purulent and irritant discharges to be pent up, and these discharges in their turn intensify the ophthalmia.

**Muscæ Volitantes.** Landolt has drawn attention to a Circle which complicates retinal hyperæsthesia, and is often present when muscæ volitantes cause annoyance to a myopic person :

“The myope sees these phenomena with greater ease, because he is seldom adapted to the source of light. Moreover, when the myopia is pernicious, the sensitiveness of the retina undergoes, from the beginning, a pathological exaggeration. Later on, to these almost physiological corpuscles are added others which are due to the retinal and choroidal exudation. The latter are now more numerous, larger and more troublesome and disquieting to the patient. He ascribes to them all kinds of shapes, and never wearies of their description, which he willingly accompanies with a faithful sketch. This is a proof of the torments to which they subject him and of the anxiety with which he observes them. This observation itself places him in a Vicious Circle of action and reaction, for the more he pursues these phantoms, the more he is harassed by them, nothing being more fatiguing than the observation of such entoptic phenomena. Thus it is that they become a cause, both direct and indirect, of the weakening of the eyesight.”<sup>1</sup>

**Retinal Hyperæmia.** In neuropaths suffering from hyperæmia of the disc exaggerated fears of

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<sup>1</sup> Refraction and Accommodation of the Eye, p. 457.



serious eye lesion are sometimes conjured up by a process of auto-suggestion, or by injudicious professional advice, the effect of which is to increase the neurosis :

“ These cases are very frequently met with in practice, and the patient’s statements are so misleading that inexperience may lead to a wrong diagnosis or to a hasty expression of opinion, with the result that the existing manifestations are merely aggravated.” <sup>1</sup>

Wholesome advice, coupled, when necessary, with correction of any minor ailment, may quickly cure the patient. As Clifford Allbutt says :

“ In neurasthenics a local ill, acting and reacting thus, establishes a short circuit and a Vicious Circle ; and the local error must be at once readjusted.” <sup>2</sup>

**Tinted Lenses.** Frequently in these and other forms of retinal hyperæsthesia the victim resorts to tinted spectacles and darkened rooms, which but serve to increase the trouble :

“ Since photophobia is kept up or even aggravated by darkened rooms, or by the use of smoked glasses, well-lit rooms must be ordered and the use of dark glasses prohibited.” <sup>3</sup>

Even apart from hyperæsthesia some persons make use of tinted glasses, of what Donders terms “ conservative spectacles,” on account of their agreeable and soothing effect. Such glasses are however objectionable since they withdraw the healthy stimulus

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<sup>1</sup> Schöbl, in Norris and Oliver, *System of Diseases of the Eye*, Vol. III., p. 581.

<sup>2</sup> Allbutt and Rolleston, *System of Medicine*, Vol. VIII., p. 755.

<sup>3</sup> Graefe-Saemisch, *Gesammte Augenheilkunde*, 1908, Vol. II., v., p. 368.



of white light, abnormally increase the retinal sensitiveness, and thus create a permanent necessity for their employment. In fact such abnormal sensitiveness is not only inconvenient, but actually predisposes to disease.<sup>1</sup>

**Papillœdema.** The development of "choked disc" or papillœdema may be dependent on a reciprocity of action. The primary cause is usually to be found in an increase of intra-cranial pressure due to hydrocephalus or a new growth, which forces the subarachnoid fluid into the sheaths of the optic nerve. Hence result engorgement of the central vein of the retina, œdema of the optic nerve, and swelling of the papilla. The nerve becomes incarcerated at the point where it fits tightly in the foramen scleræ, and causes strangulation of the papilla and thus further obstruction in the vein.<sup>2</sup> In the words of Victor Horsley, "the resistance of the scleral ring causes strangulation and thereby sets up a Vicious Circle of pressures."

**Dacryo-Cystitis.** An important Circle is sometimes met with in cases of dacryo-cystitis associated with stricture of the lachrymal duct. The trouble begins with congestion of the lachrymal sac, causing some obstruction of the duct, which is in turn

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<sup>1</sup> Donders, Accommodation and Refraction of the Eye (N.S.S.), p. 219.

<sup>2</sup> Fuchs, Lehrbuch der Augenheilkunde, 1910, p. 645.

followed by retention and decomposition of the secretions. The consequent irritation produces further narrowing, often ending in complete obstruction.

**Exophthalmic Goitre.** For the sake of completeness allusion may be made here to the Vicious Circle that complicates exophthalmic goitre (Basedow's disease). It has already been described on p. 45.

## II.—CIRCLES ASSOCIATED WITH THE EYE-LIDS.

The eye-lids have already been alluded to more than once as forming one of the factors concerned in the establishment of Circles. But it will be convenient to group some additional illustrations under a separate heading.

**Ectropion.** Ectropion is a common disorder that frequently perpetuates itself in a Circle, since it both results from, and provokes further, lachrymation.

Any attack of epiphora that produces a macerated and contracted state of the skin of the lower lid may start the process. For the contraction of the skin leads to eversion of the punctum, and this is followed by increased epiphora. In the words of Panas :

*“ La peau irritée par les larmes se rétracte davantage, créant ainsi un Cercle Vicieux qui aboutit à l'ectropion.”*<sup>1</sup>

Chronic catarrhal conjunctivitis as seen in elderly people supplies an example. Conjunctivitis and the irritation extending along the canaliculus lead to

<sup>1</sup> Panas, *Maladies des Yeux*, Vol. II., p. 333.

eversion of the punctum lachrymale, to epiphora, and to relaxation of the palpebral portion of the orbicularis :

“ When the position of the lid has thus been altered, the tears flow over the cheek, causing eczema, with thickening and excoriation of the skin, so that a Vicious Circle is set up, which tends always further and further to increase the deformity.” <sup>1</sup>

The patient often aggravates his trouble by stroking movements from above downwards in order to wipe away the tears. The ectropion and consequent epiphora are thus perpetuated.

A similar condition is readily set up in children with phlyctenular ophthalmia, especially if there is a tendency to eczema.

“ The lachrimation in phlyctenular ophthalmia increases the eczema, which then, by causing contraction of the skin of the lower lid, produces eversion of the inferior punctum lacrymale, and this, in its turn, causes increased lachrimation, and thus a Vicious Circle is set up.” <sup>2</sup>

Tinea tarsi acts rather differently, since it causes the edges of the lids to become rounded, thickened and everted, and in this way leads to epiphora.

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<sup>1</sup> Berry, Diseases of the Eye, p. 58 ; Fuchs, Text-book of Ophthalmology, p. 65.

<sup>2</sup> Swanzy, Diseases of the Eye and their Treatment, p. 193. In the latest edition, Swanzy and Werner, Diseases of the Eye (1907), p. 277, the same reciprocal condition is described, although the term Vicious Circle is not used.



**Chemosis of Eye-lids.** In chemosis of the eye-lids a Circle may be established when the bulging conjunctiva stretches the ciliary portion of the orbicularis, the contraction of which causes eversion of the lid. The everted lid and contracting orbicularis then act like a ligature, and aggravate the chemosis by strangulating the conjunctival veins. A similar form of spastic ectropion not infrequently follows an attempt to open the palpebral fissure in a child with swollen lids and blepharospasm.

**Entropion.** Entropion also presents some examples of a Vicious Circle, as for example when the lid margins are incurved by spasmodic contraction of the ciliary fibres of the orbicularis. Relaxation of the skin and a disappearance of the subcutaneous fat act as predisposing factors, the exciting cause being some conjunctival or corneal irritation and photophobia, which cause reflex contraction of the orbicularis. The complication is common after cataract extraction in old people. When once induced, the entropion is maintained and intensified by the irritation that it produces.

The severe form of entropion which is associated with trichiasis, keratitis and blepharospasm has already been alluded to on p. 123.

**Blepharophimosis.** Where cicatricial entropion is associated with contraction of the conjunctiva and cartilage, the commissure is frequently narrowed,



producing what is known as blepharophimosis and further increasing the tendency to inversion. Muscular spasm and trichiasis are frequently present as aggravating factors.

**Trachoma.** Burnett draws attention to reciprocal conditions that are present in trachoma :

“ As we seldom see these cases until the inflammatory symptoms send the patient to the surgeon, there has always been a question as to whether the deposit is the cause or the result of the inflammation. From the fact, however, that they have been found in eyes which have not been inflamed, it would appear more likely that the inflammation is not the first step in the process, though undoubtedly the inflammation when it is once set up, facilitates its progress and encourages new deposits, and thus a Vicious Circle is completed.”<sup>1</sup>

This Circle is especially injurious when, owing to the photophobia and the sticking together of the lids, the secretions are pent up and thus aggravate the conjunctival and corneal trouble.

**Fissure of Canthus.** In cases of fissure of the canthus cause and effect sometimes act reciprocally on each other. Where corneal and conjunctival irritation are accompanied by photophobia and spasm, a superficial ulceration is frequently caused by the continuous folding of the skin at the outer canthus

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<sup>1</sup> Norris and Oliver, System of Diseases of the Eye, Vol. III., p. 209.

and by the conjunctival discharges. This ulceration by reflex irritation increases the orbicular spasm and acts as an important factor in maintaining the irritable condition of the eye.

**Eczema.** The itching that accompanies eczema of the eye-lids may also perpetuate the disorder by the scratching which it provokes. Axenfeld thus describes the process :

“ The intense itching causes the patient, generally a child, to keep on scratching. By this means the secretions are smeared over the face and aggravate the mischief.” <sup>1</sup>

### III.—CIRCLES ASSOCIATED WITH ERRORS OF REFRACTION.

Almost every error of refraction may at times be complicated by the operation of a Circle.

**Myopia.** In myopia, for example, reciprocal relations are frequently established between accommodation and convergence, on the one hand, and posterior staphyloma, on the other, especially in the case of young persons whose eyes possess no great resisting power.

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<sup>1</sup> Lehrbuch der Augenheilkunde, p. 229.

**Landolt thus describes the factors which give rise to this Circle :**

“ The influence of near work may manifest itself in different ways. It will be noticed even that the three principal modes of production of myopia that we have mentioned, are so intimately related to each other that one of them necessarily suggests the others. Exaggeration of convergence leads to that of accommodation. The latter, of itself alone, and also by the excessive nearness of the object, which it necessitates, and the position which gives rise to cephalic hyperæmia, favours the production of choroiditis. The affection of the membranes of the *fundus oculi* entails a diminution of the acuteness of vision, which, in its turn, makes the gradual approach of the object and exaggeration of convergence obligatory.

“ Sometimes this Vicious Circle will be opened, on the contrary, by diminution of the acuteness of vision, and, at other times, by a spasm of accommodation. But at whatever point this wheel of misfortune takes up the victim, he must go round with it, and will have to inexorably pass through the series of injurious influences, which reinforce each other to aggravate the evil.

“ When we take into consideration this linking together of harmful causes, we are no longer surprised at the rapid and constant progress made by myopia in an eye which it has once attacked, especially when the latter has been, from birth, disposed to it, or is deprived of the ability to resist it.”<sup>1</sup>

**Noyes lays stress on the weakness of the muscular apparatus as leading to the establishment of the Circle :**

“ Want of proper balance among the muscles, as they combine in their action, provokes unnatural strain and leads . . . . to undue pressure on the globe. The difficulty of steady fixation induces close approximation of the work to the eye, and thus cause and effect are set going in a Vicious Circle.”<sup>2</sup>

<sup>1</sup> Refraction and Accommodation of the Eye, p. 454.

<sup>2</sup> Diseases of the Eye, p. 64.

The influence of myopia on general health may give rise to a second Circle. Thus Lawson, speaking of progressive myopia, writes :

“ The general health in young children often suffers greatly from the aching and general discomfort they experience, and in this way a Vicious Circle may be established which favours the rapid advance of the disease.”<sup>1</sup>

**Hypermetropia and Astigmatism.** Hypermetropia and astigmatism may act in a similar way by lowering nutrition and depressing the general health. Indeed under unfavourable circumstances, any form of ametropic asthenopia may establish

“ the Vicious Circle of cause and effect : eye-strain, with its pain and nervous disturbances, producing interference with assimilation and nutrition, which in its turn so reduces the general physical condition as to induce an increase in the asthenopia.”<sup>2</sup>

**Heterophoria.** Frequently heterophoria complicates ametropia and aggravates its pernicious effect :

“ Just as it is true that ametropia and heterophoria can and do produce impaired health, so conversely will impairment of health give rise to heterophoria and exposure of ametropia.”<sup>3</sup>

**Anisometropia.** R. W. Doyne has recently drawn attention to a Circle that is frequently present in anisometropia, disturbance of the fusion centre

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<sup>1</sup> Diseases and Injuries of the Eye, p. 67.

<sup>2</sup> Norris and Oliver, System of Diseases of the Eye, Vol. IV., p. 405 ; Gould, *British Med. J.*, 1903, Vol. II., p. 663.

<sup>3</sup> Norris and Oliver, L.c., Vol. IV., p. 420.



and exhaustion of the muscles of accommodation being *participes criminis* :

“The trouble arises from a Vicious Circle. The fusion centre demands clear images and makes demands on the lower centres which control the muscles of the eyes ; the muscles become exhausted, the images become indistinct, and the fusion centre becomes more imperious, as its task becomes more difficult. Moreover, all these details are mainly subconscious and independent of the will.”<sup>1</sup>

**Presbyopia.** A Circle comes into operation with the advent of presbyopia as a result of the effort to obtain distinct vision by accommodation.

Inasmuch as a presbyope must hold his work at an unusually long distance, the retinal image becomes too small and indistinct for clear vision, and tempts him to bring the work closer to his eyes. By doing so, however, he overtaxes his accommodation which in turn renders his work indistinct, compels its removal to a distance, and so completes the Circle.

**Lowered Vitality.** The reciprocal relations that are so frequently established between ametropia and lowered vitality illustrate a pathological condition by which any form of eye disease may be complicated. For what disorder of the visual apparatus exists which does not more or less detract from the full standard of health, and which is not in turn aggravated by impaired health ?

It was well said by Paget that “the health of each part is a necessary corollary of the health of all the rest.” Equally true is it that disease of one part involves disease of all the rest.

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<sup>1</sup> *British Med. J.*, 1910, Vol. II., p. 363.

Diseases of the eyes present some excellent illustrations of the principle that the *Vis Medicatrix Naturæ* is sometimes a curse instead of a blessing.

**Blepharospasm.** For example, the blepharospasm frequently associated with keratitis is a beneficent provision which screens the inflamed surfaces from light, dust and other irritants. The blepharospasm, however, often ends in a spastic entropion, which causes the cilia to be directed backwards, and thus increases, instead of diminishing, the corneal irritation which formed the primary trouble.

**Epiphora.** Again, where there is some obstruction to the canaliculi, epiphora is a means of getting rid of the surplus lachrymal secretion which is unable to escape through the natural channels. But if the lower lid, in consequence of the constant wetting with the tears, is attacked with eczema, the skin contracts, everts the punctum, and renders the canaliculi even less competent than before.

**Glaucoma.** Lastly, in glaucoma, where the angle of the anterior chamber is shallow and ciliary congestion has reduced the circumlental space, the lens and iris are pushed forward by the fluid that has accumulated in the vitreous humour. This forward movement is doubtless beneficent in purpose and relieves the abnormal tension. But inasmuch as the same movement further blocks the anterior chamber, it merely aggravates the mischief. The *Vis Medicatrix* has, in truth, become the *Vis Devastatrix*.

## Chapter Nine

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### Artificial Circles.



FEW illustrations may be given of Circles<sup>1</sup> which are not caused by disease, but which are artefacts (Fig. VIII.).

**Cathartics.** For example, the excessive use of cathartics, due to the wide-spread advertisement of quack remedies or to the impatience of over-zealous disciples of Æsculapius, is responsible for many an artificial Circle.

The irritation of the mucous membranes brought about by indiscriminate drugging depraves the

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<sup>1</sup> The term Vicious Circle has sometimes been applied to conditions where there are no reciprocal forces in operation and which, therefore, do not fall under the definition given above. A so-called Vicious Circle is occasionally established after the operation of gastro-enterostomy, where the contents of the afferent end of the jejunum (that is the segment above the artificial opening), instead of passing into the efferent segment, return through the artificial opening into the stomach and set up regurgitant vomiting. Or the contents of the stomach may pass into the afferent loop through the artificial opening and back into the stomach instead of escaping through the efferent loop. A "short-circuiting," in fact, takes place, leading to grave difficulties for which a complementary entero-enterostomy may be required.



secretions and produces a condition which is urged as an indication for the need of further evacuation :

“ And thus the practice proceeds in a Vicious Circle of habit from which the patient is rarely extricated without more or less injury to his future health.”<sup>1</sup>

The constipation is relieved, but is followed by more obstinate constipation requiring stronger aperients.

**Alcohol.** Circles may result from the use of alcohol and various drugs, especially in neurotic persons :

“ In a neurasthenic individual a stimulant gives temporary relief, but leaves the neurasthenia as it is or even increases it, and afterwards the neurasthenia causes an irresistible desire for the stimulant which, while it gave relief, aggravated the disorder. Therefore the substances in question cannot be considered as the only causes of the disorders mentioned, but they form a secondary link in the Vicious Circle, which always in pathology plays such an important rôle, the primary link being the morbid constitution.”<sup>2</sup>

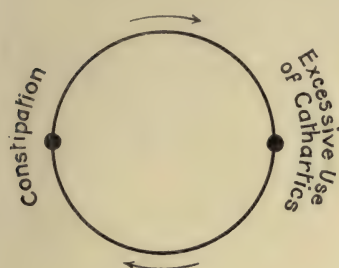
Apart from neurasthenia, however, a Circle is frequently established by alcohol when it causes gastric irritation and anorexia. This condition induces a sense of exhaustion and disinclination for work which tempts to further indulgence. At a later stage the chronic atony and dilation of the stomach, with the reciprocal relations that have already been described in Chapter V., are apt to follow, and if the misguided victim still flies to the bottle for relief, he but pursues a will-o'-the-wisp that will lure him to destruction.

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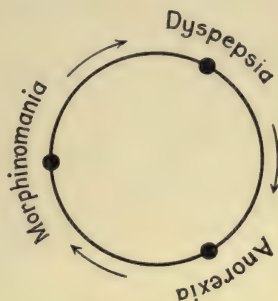
<sup>1</sup> Sir Henry Holland, *Medical Notes and Reflections*, p. 100, called attention to this Circle as far back as 1839, and there are probably still earlier references.

<sup>2</sup> Tuke, *Dictionary of Psychological Medicine*, s. Neurasthenia.

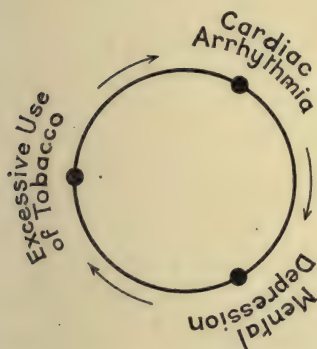




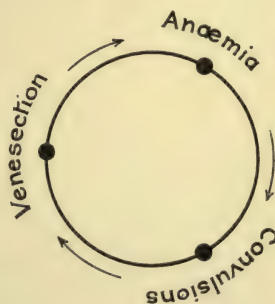
Excessive Purgation



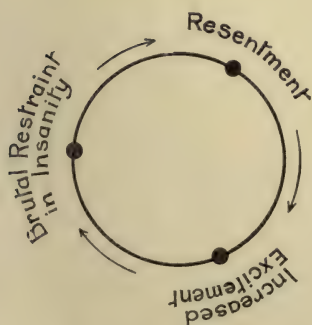
Morphinomania



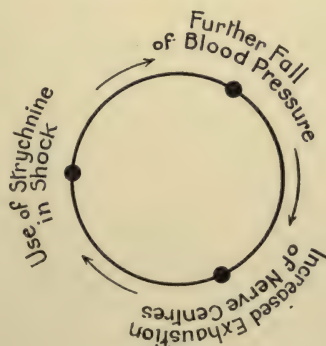
Abuse of Tobacco



Repeated Venesection



Restraint in Insanity



Strychnine in Shock

Fig. VIII. Artificial Circles.

Misery and poverty frequently lead to alcoholic indulgence. As we read in the Book of Proverbs "Give wine unto the bitter in soul ; let him drink and forget his poverty, and remember his misery no more."<sup>1</sup> But alas ! the alcohol in most cases simply intensifies both misery and poverty.

**Tea.** Tea is also associated with a Circle, especially when infused long and drunk strong, as in Ireland. For the resulting dyspepsia further recourse to tea is the usual remedy, a fresh brew being used to remove the very symptoms that former brews have produced.

**Morphia.** In morphinomania the *habitué* is ensnared by the toils of a habit Circle from which escape is all but hopeless ; for this drug, while satiating the immediate craving, creates an appetite for further indulgence, and weakens that self-control without which no salvation is possible :

" Dans ces conditions le sujet tourne dans un véritable Cercle Vicieux. . . Avant le repas il se pique pour exciter l'appétit toujours défectueux ; après le repas, nouvelle piqûre pour faciliter la digestion. . . Aussi les doses injectées ne tardent-elles pas à devenir de plus en plus répétées, de plus en plus considérables." <sup>2</sup>

**Tanzi well describes the condition :**

" Each new injection must be larger or more quickly repeated than the preceding one, in order to give the desired effect. Thus a Vicious Circle is established, which gives morphinism the character of a fatally progressive habit." <sup>3</sup>

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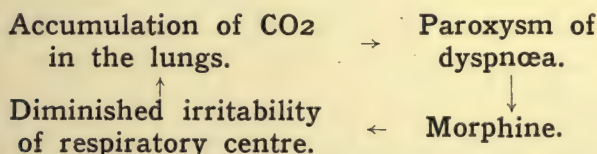
<sup>1</sup> Ch. XXXI.

<sup>2</sup> Tourette, *Maladies du Système Nerveux*, p. 244.

<sup>3</sup> *Textbook of Mental Diseases*, p. 334.

Very applicable here are the well-known words of Virgil *ægrescitque medendo*, "the disorder increases with the remedy."

The injudicious use of morphia in attacks of cardiac asthma is apt to do harm by establishing a Circle. Although the drug may temporarily relieve the distress, it diminishes the irritability of the respiratory centre and allows more CO<sub>2</sub> to collect in the blood. The asthmatic then requires an increasing dose of morphia to relieve him, and a Circle is created which Hirschfelder represents in the following way : <sup>1</sup>



A curious condition sometimes accompanies morphia poisoning due to hypodermic injection. A large proportion of the drug is first excreted into the stomach and intestines ; it is then reabsorbed and re-excreted, thus working in a Circle. <sup>2</sup>

**Tobacco.** Tobacco when injudiciously used may also establish reciprocal relations. Thus mental depression sometimes leads to excessive indulgence.

<sup>1</sup> Diseases of the Heart and Aorta, p. 149.

<sup>2</sup> Allbutt and Rolleston, System of Medicine, Vol. II., i., pp. 942-3, 956.

The result is dyspepsia and a feeble cardiac action, leading to further depression and more tobacco, *et ainsi de suite*.

**Bromides.** There are various other drugs such as bromides whose incautious use has done harm. Few drugs have a greater tendency to depress the recuperative power of a disordered nervous system. Yet, especially in former days, bromides were extensively administered to cure the very conditions in which that recuperative power was lacking.

**Bismuth.** Gastralgia is occasionally treated by bismuth or similar sedatives, when a wiser plan would be to remove the irritant ingesta by means of an emetic or an aperient. The bismuth temporarily lulls the pain ; as a result more of the same food is taken, and the gastralgia returns in an aggravated form.

**Strychnine.** Strychnine has often been incautiously used in cases of severe post-operative shock associated with exhaustion of the vaso-motor centres and dilatation of the splanchnic area. Indeed at one time the routine treatment consisted in the use of strychnine. Recent research, however, based on manometric observations, has proved that stimulants of any kind are useless for the purpose of arresting the fall of blood pressure. On the contrary their administration has the effect of still further paralyzing vaso-motor action, and thus lowering the



pressure. In other words, the symptoms of shock led to the administration of strychnine, the very thing, as we now know, that is calculated to increase shock. Many recoveries might have occurred, had no strychnine been used.

**Mechanical Support.** Another injudicious mode of treatment is met with in some cases of spinal weakness, where a mechanical support is relied upon for the cure of the muscular weakness. The support increases the spinal weakness, which in turn calls for more and more support. Applying the lesson to a much commoner article of attire than the spinal jacket, we may say that the corset creates the demand which it supplies.

**Venesection.** But perhaps the best example of an artificial Circle may be found in the use of venesection as practised for many centuries. Formerly, indeed, venesection was regarded as a panacea for almost every ailment, acute or chronic, and the evidence is only too clear that *venesection ad mortem* was no uncommon occurrence, death being erroneously attributed to the illness instead of to the loss of blood.

The custom was to bleed until the patient became faint, when recovery was allowed to take place. In the case of many diseases, especially such as are accompanied by fever or pain, e.g. pneumonia, peritonitis and typhoid, some remission of the symptoms followed recovery from the faintness, a remission

which was hailed as evidence of the beneficence of the operation, and led to its being repeated again and again, if the fever or pain recurred.

When, however, blood is drawn *pleno vivo*, the symptoms produced (for example, palpitation, vertigo, violent headache, jactitation, convulsions, coma) resemble those of inflammatory disorders, and were attributed to a recrudescence of the original mischief, although really due to anæmia. Unwary practitioners were easily led astray. In the *Lancet* of 1827 an illustrative case is given which may be briefly summarized :

A man fell from a scaffold and fractured several ribs. On reaching St. Bartholomew's Hospital early on a Friday morning he was bled 18 oz., and at noon 20 oz. more. The next day a further 18 oz. were taken, and on the following day 18 oz. at noon and 18 oz. in the evening. On Monday the pulse was small and jerking, but very compressible. This condition was regarded as "indicative of inflammation and not resulting from loss of blood or hæmorrhagic irritation." Accordingly bleeding was again ordered to the extent of 18 oz. The dresser in charge of the case, however, alarmed by the condition following the loss of a few ounces, desisted from drawing any more. Nevertheless, when about two hours later two surgeons saw the man in consultation, they ordered 20 oz. more to be drawn. After this the pulse became a mere flutter, death taking place a few hours later. <sup>1</sup>

Many such cases could be quoted in which cause and effect were inextricably mixed up, the venesection being repeated to remove the very symptoms it had produced.

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<sup>1</sup> Vol. II., p. 94.

**Uterine Disorders.** An artificial Circle has at times been created by unnecessary tinkering with the reproductive apparatus, especially in neurasthenic females suffering from some minor uterine ailment. The constant direction of the mind to the sexual organs induces an unhealthy mental condition which perpetuates and exaggerates her malady. Many a sensitive over-anxious woman with a slightly prolapsed, ante- or retro-verted uterus has been transformed into an incurable neuropath. Such patients come to be obsessed with their ailment and the obsession is only too readily aggravated by injudicious interference.

**Restraint.** Another illustration may be found in the general use in earlier days of fetters, hand-cuffs, strait waistcoats, and other brutal apparatus for the coercion of the imbecile or the insane. Such restraint, in lieu of promoting amelioration, provoked intense resentment and excitement or even permanent mania, the secondary irritation being urged as a plea for further coercion. Frequently a temporarily excited or eccentric person was goaded into a condition of permanent lunacy by the treatment that was inflicted.<sup>1</sup>

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<sup>1</sup> Gardiner Hill, *Non-Restraint System of Treatment in Lunacy*, pp. 103, sq. ; Griesinger, *Mental Diseases* (N.S.S.), pp. 491, sq. ; *British Med. J.*, 1910, Vol. I., p. 519.

These atrocious methods, not so long ago universally advocated by the profession, may well keep us chastened in spirit, and serve as warnings lest a *nimia diligentia* lead to the adoption of methods of treatment without the fullest enquiry.





## Chapter Ten.

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### The Genesis of the Circle.



HERE are various pathological conditions which give rise to Circles.

#### I.—MALNUTRITION BREEDS MALNUTRITION.

Illustrations :

**Anæmia.** In anæmia the quality of the blood supplied to the viscera is defective, and depreciates the functions of secretion, peristalsis and absorption. As a result the supply of nutriment to the body is curtailed, and the deficiency perpetuates the anæmia. As as been well said “the dyspeptic suffers from starvation.”

**Stenosis of Coronaries.** Where there is stenosis of the coronary arteries, the supply of blood reaching the myocardium is inadequate. The result is imperfect nutrition and a weaker systole, causing further impairment of the blood-supply.

## II.—THE VIS MEDICATRIX MAY BECOME THE VIS DEVASTATRIX NATURÆ.

Illustrations : <sup>1</sup>

**Strangulated Hernia.** The vomiting consequent upon strangulation of a hernia is intended to empty, and thus secure rest for, the irritated bowel. The actual effect of vomiting, however, is frequently to increase the strangulation.

**Blepharospasm.** The blepharospasm associated with keratitis screens the inflamed corneal surface from light, dust and other irritants. It may, however, happen that the blepharospasm gives rise to a spastic entropion which causes the cilia to be directed backwards. The keratitis is then aggravated instead of benefitted by the blepharospasm.

## III.—THE IRRITATION CAUSED BY AN INFECTIVE AGENT MAY BE THE MEANS OF EFFECTING A FRESH LODGMENT.

Illustrations :

**Oxyurides.** Where the rectum is infested with oxyurides, the irritation and consequent scratching may lead to portions of the helminths or their ova being caught under the finger nails, conveyed to

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<sup>1</sup> Some further illustrations will be found in Chapters IV. and VIII.

the mouth and swallowed by the host. By this means the ova reach the intestines, where they rapidly attain sexual maturity, and only await a favourable opportunity to complete the Circle. Thus the irritation is the means of securing successive generations of the parasite.

**Ankylostomiasis.** The habit of geophagy sometimes induced by ankylostomiasis may renew the infection and protract the disease.

#### IV.—A CIRCLE MAY BE THE PENALTY PAID FOR THE ADVANTAGES OF ORGANISATION.<sup>1</sup>

Illustrations :

**Heart Failure.** An example of a Circle resulting from the interdependence of organs may be found in the case of failure of the right ventricle associated with visceral congestion. The failure of the ventricle leads to congestion of the portal area and to impaired digestion. The blood reaching the heart is then loaded with the products of imperfect digestion, which sap the nutrition of the heart, and thus tend to further failure. The good manners of the heart are readily corrupted by evil communications of every description.

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<sup>1</sup> Mitchell Bruce, Principles of Treatment, p. 190.

V.—ONE DISORDER MAY DISTURB SEVERAL FUNCTIONS AND PREVENT THEIR COMPENSATING EACH OTHER.

Illustration :

**Atonic Dyspepsia.** In atonic dyspepsia the various gastric functions, such as secretion, absorption and motility, are simultaneously impaired, and are thereby prevented from coming to the assistance of each other. If the secretion of the digestive juice were alone involved, while peristalsis continued normal, some increase of peristalsis would accelerate the passage of the food-pulp through the pylorus to be digested in the intestines and thus compensate for the deficient gastric secretion. Or if the motor activity were alone impaired, compensatory increase of secretion and absorption might take place, leaving the partially digested chyme for the intestinal juices to deal with. But owing to the association of several functional disorders, an obstinate Circle is established, as Ewald<sup>1</sup> points out, in every disease of the stomach.

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<sup>1</sup> Eulenburg, Real-Encyclopädie, Vol. XIV., p. 269.



VI.—THE DISPLACEMENT OF AN ORGAN MAY CAUSE MECHANICAL DISTURBANCE WHICH AGGRAVATES THE DISPLACEMENT.

Illustrations :

**Retroversion of Gravid Uterus.** When a retroverted gravid uterus is so impacted as to press on the urethra, it frequently causes retention of urine and distention of the bladder. The distended bladder increases the retroversion and impaction of the gravid uterus.

**Gastrectasis.** In cases of gastrectasis the dilated organ may sink in the abdomen and pull down with it the horizontal section of the duodenum. The result is a kinking of the gut which renders more difficult the escape of the food-pulp, and thus promotes further gastrectasis.

VII—STRANGULATION MAY BE BOTH THE CAUSE AND RESULT OF CONGESTION.

Illustrations :

**Paraphimosis.** In paraphimosis the constriction of the glans causes acute congestion and œdema. These in their turn increase the strangulation.

**Strangulation of Intestine.** When a loop of intestine is strangled, acute congestion takes place, while the lumen is distended with blood and gas. The result is increased strangulation.

### VIII.—IMPERFECT REPAIR MAY PREDISPOSE TO A FRESH ATTACK.

Illustrations :

**Endocarditis, Etc.** The lesions left by such disorders as endocarditis, pericarditis, gastric ulcer and appendicitis shew but little tendency to repair. Frequently there persists a liability to recrudescence and a diminished power of resistance to exposure, which establishes a Circle of indefinite duration. Each attack adds to the existing lesion and further paves the way for a fresh attack.

### IX.—COMPENSATORY PROCESSES ARE ONLY PARTIALLY ADAPTED TO THE END IN VIEW.

Illustration :

**Aortic Regurgitation.** In aortic regurgitation the dilated and hypertrophied left ventricle pumps a larger quantity of blood than the normal amount into the aorta at each systole and by this means may ensure a normal supply of blood to the tissues, thus compensating in great measure for the regurgitation. But in spite of such compensatory changes, the coronary arteries are not maintained in a replete condition for as long a period as they would be with a normal heart. Hence results in time impaired nutrition and degeneration of the myocardium, establishing the Circle of enfeebled systole and increased regurgitation.

X.—THE ABSENCE OF CLEANLINESS MAY ESTABLISH A CIRCLE.

Illustrations :

**Balano-posthitis.** The accumulation and retention of smegma under the prepuce may provoke balano-posthitis which in its turn leads to further secretion and accumulation.

**Oral Sepsis.** Oral sepsis and dental caries frequently stand in reciprocal relation to one another.

XI.—CERTAIN FUNCTIONAL DISORDERS TEND TO BECOME HABITUAL AND PROVOKE RECURRENCE.

Illustrations :

**Cough.** Some muscular actions, through incessant repetition, so irritate and disturb the medullary centre as to pervert the reflex mechanism and produce an exaggerated activity. For example, a prolonged and excessive cough may become uncontrollable, and persist long after all local irritation has ceased. A similar persistence may be associated with vomiting, diarrhœa, blepharospasm and cardiac arrhythmia.

**Epilepsy.** Another form of "Habit Circle" is met with in recurrent epilepsy, where every attack increases the labile condition of the nerve centres and facilitates recurrence.

XII.—FAILURE OF THE RESERVE FORCE  
MAY AGGRAVATE THE PRIMARY CAUSE  
OF FAILURE.

Illustration :

**Pneumonia.** In acute pneumonia, the resistance in the pulmonary circuit may be greatly increased. In order to overcome this resistance, the heart acts more forcibly, its reserve contractile power being called into play. In many cases this suffices to overcome the increased obstruction. If, however, the latter is unusually severe, or if, owing to disease or to senility, the reserve power of the heart is depreciated, such reserve may prove inadequate, and heart failure results. The heart and lungs then become *participes criminis*, a Circle being established which frequently accounts for the fatal issue.

XIII.—ONE NEUROSIS MAY CREATE OTHER  
NEUROSES WHICH INTENSIFY THE  
PRIMARY DISORDER.

Illustration :

**Neurasthenia.** Neurasthenia commonly gives rise to insomnia, and this in turn increases the neurasthenia.



#### XIV.—THE ANATOMICAL DISPOSITION OF BLOOD-VESSELS MAY ESTABLISH A CIRCLE.

Illustration :

**Arrangement of Blood-Vessels.** West<sup>1</sup> has pointed out how the anatomical disposition of the blood-vessels on the two sides of the heart may lead to reciprocal disorder. When the right side of the heart fails, the coronary veins (returning both from the right and left side) which open into the right auricle, soon become engorged. From this follows impaired circulation through, and impaired nutrition of, the whole heart. Implication of the left ventricle leads to a diminution in its driving power, to pulmonary congestion and to defective aëration of the blood, and also to defective flow through the coronary arteries, thus causing further cardiac weakness.

A similar sequence obtains when dilatation commences on the left side, since the right side must soon be likewise implicated. And so it comes about that right-sided failure involves the left side, and left-sided failure involves the right, and unless the Vicious Circle can be broken, a lethal result is only too probable.

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<sup>1</sup> Diseases of the Organs of Respiration, Vol. I., pp. 129, 130, 237.

### XV.—A CIRCLE MAY BE ESTABLISHED BY INJUDICIOUS TREATMENT.

#### Illustrations :

**Uterine Displacement.** Undue importance attached to minor uterine displacements may lead to the formation of a Circle, especially in neurasthenic women. Some pelvic ache, associated with a retroverted, anteverted or prolapsed uterus, is treated by months of sofa and pessaries ; this induces an unhealthy mental condition, perpetuating trivial sensations and making the victim more and more dependent on her mechanical support.

**Tinted Lenses.** The unauthorised use of tinted lenses in retinal hyperæsthesia frequently increases the hyperæsthesia instead of curing it, the hyperæsthesia being in the first instance the cause, and in the end the result, of the use of lenses.



## Chapter Eleven.

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### The Breaking of the Circle.



WHEN disease is complicated by the operation of a Vicious Circle, recovery can only take place after the Circle has been broken. For a self-perpetuating process is at work, one which pursues a *crescendo* course, and for which the ordinary provisions with which Nature is endowed for counter-acting disease or repairing injury no longer suffice. Some unusual effort or extra-ordinary mechanism is required.

Some Circles can be broken by natural means. For others the resources of the *Ars Medendi* are indispensable. Some illustrations of the two methods will be of interest.

#### I.—THE BREAKING OF THE CIRCLE BY NATURAL MEANS (fig. IX.).

**Gastritis.** An example may be found in gastritis, a disorder in which, as Cohnheim and Ewald long ago pointed out, the functions of peristalsis, secretion

and absorption reciprocally depreciate each other, and so prevent compensation.<sup>1</sup> If the result of gastritis were merely a deficiency of gastric juice, this might be remedied by increased peristalsis hastening the discharge of the ingesta into the intestine to undergo digestion there. And compensatory processes might similarly make good defective peristalsis and absorption.

But as the various functional derangements have such a tendency to become associated, gastritis becomes a very chronic and obstinate disorder ; in fact the resulting Vicious Circle is one which, in the view of some writers,<sup>2</sup> unaided Nature is unable to cure. But this is certainly incorrect. For even though the reciprocating conditions have been at work for days or even months, a sudden explosion of peristalsis may sweep the gastric contents into the duodenum, or an active emesis may clear the stomach, and in either case break the Circle.

**Gastrectasis.** Gastrectasis associated with prolonged retention of the ingesta represents a severer form of the same disorder ; in this case the dilatation and the retention aggravate each other. The usual reflexes lie dormant and peristaltic movements are in abeyance. But sooner or later the burden becomes

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<sup>1</sup> Cohnheim, Lectures on General Pathology (N.S.S.), Vol. III., pp. 856-859 ; Ewald, Diseases of the Stomach (N.S.S.), pp. 350, 484-5.

<sup>2</sup> Cohnheim, Lectures on General Pathology (N.S.S.), Vol. III., p. 859.



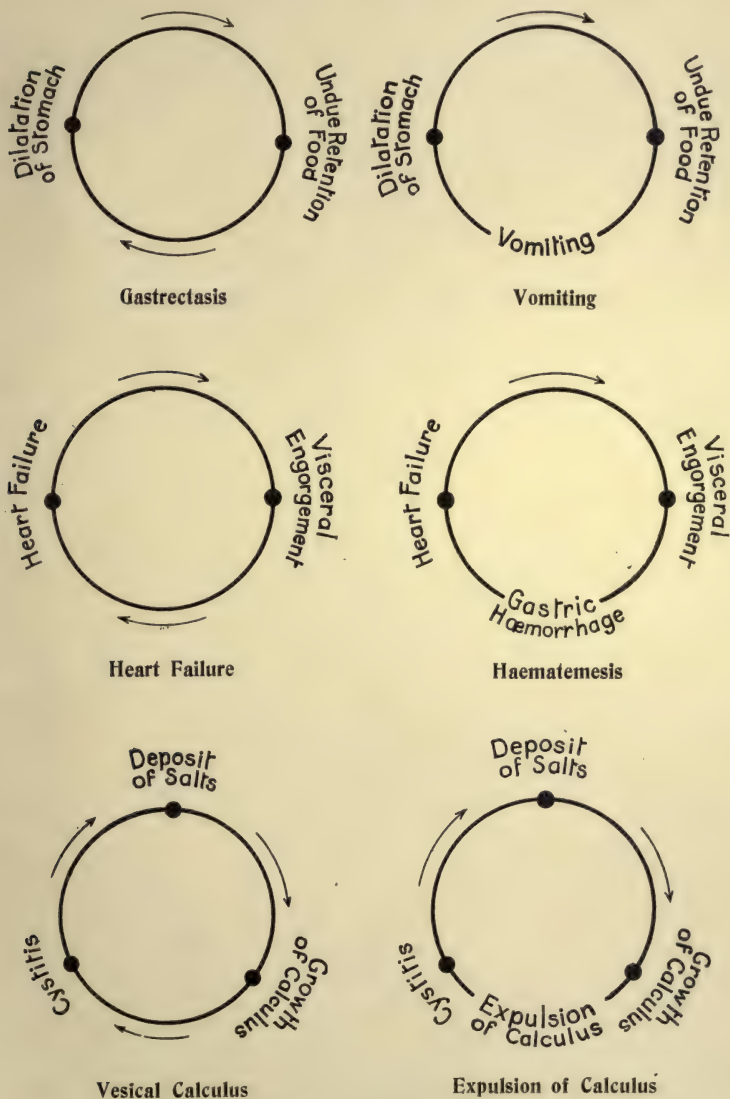


Fig. IX. The Breaking of a Circle by Natural Means.

insupportable. The machinery of vomiting is started, and the stomach pumps up its contents, perhaps to the extent of a bucketful. Even a greatly dilated stomach may in this way be again braced up, the unburdening leading to great amelioration or even to actual recovery.

**Heart Failure.** A dangerous Circle is sometimes met with where visceral congestion has resulted from heart failure. Here the *Vis Medicatrix* may take the form of a sharp attack of gastric or intestinal hæmorrhage ; indeed such a loss of blood is often a blessing in disguise. The over-burdened heart is relieved, while the engorged viscera can resume work and again supply wholesome nutriment to the failing myocardium. The lost equilibrium of the vascular system is restored.

**Aortic Regurgitation.** Hypertrophy of the heart in cases of valvular lesions is a beautiful example of Nature's method of breaking the Circle. Thus in aortic regurgitation the coronary arteries are inadequately filled, the myocardium is enfeebled, leading to a feebler systole and increased regurgitation. Life itself may for a time be in danger. But if only the work of the heart is lightened by physical and mental repose, compensatory hypertrophy will in time largely make up for the valvular defect and enable the heart, even though unsound, to carry on the circulation.

**Pleuritic Effusion.** The absorption of a pleuritic or a pericardial effusion illustrates another way in which Nature may break a Circle.

So long as the effusion is increasing, the reciprocal conditions described on pp. 35, 62 continue in operation. But with arrest of the effusion a healthy Circle takes their place. The lymphatic pump which was previously choked again begins to work. And as the fluid is got rid of ounce by ounce, as the pressure on the effluent veins and lymphatics is lessened, as the stomata are cleared, as the cardiac and respiratory movements regain their freedom, so the pump grows in efficiency. A less common method of cure is by the natural evacuation of the effusion through the lungs or some other channel.

**Obesity.** Obesity presents an illustration of a Circle which can be readily broken through :

“ As soon as the accumulation of fat begins to deter the patient from taking active exercise, a Vicious Circle is established, and he tends to increase in weight more and more.” <sup>1</sup>

Many persons, although all too few, are conscious of the disabilities that attend early obesity and accordingly change their mode of life. An alteration or limitation of diet, the pursuit of some form of athletic sport, a visit to a Spa with its waters and baths may each under suitable circumstances effect the cure.

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<sup>1</sup> Krehl, Clinical Pathology, tr. by Hewlett, pp. 342, 344.

**Retention of Urine.** An important Circle has been described above in which prostatic or urethral congestion gives rise to retention of urine and the retention in turn intensifies the congestion. If surgical aid is unobtainable, Nature sooner or later breaks the Circle, although her methods are clumsy and the results often disastrous. Sometimes the accumulated urine escapes through a vesical pouch and a fistulous opening ; at other times a rupture of the bladder takes place.

**Prolapse of Uterus.** Physical rest is one of Nature's potent instruments for remedying the conditions under discussion. The common back-ache in a woman with a congested and prolapsed uterus is a familiar example. The pain compels a salutary rest, which rest allows the displaced and congested organ to recover.

**Myopia.** Again in progressive myopia the asthenopia compels the sufferer to abandon work that is over-taxing his accommodation, and thus relieves the injurious pressure relations.

**Calculus.** Attention has been drawn above to the sequence of events occurring during the growth of a biliary, renal or other form of calculus. For many a long year such morbid correlations may persist. But all at once, without apparent cause, the offending calculus is expelled. The Circulus Vitiosus is at an end !



Enough has been said to illustrate the principle that the resources of Nature do in some instances suffice to interrupt a Circle.

Under other circumstances however she is unequal to the task. This for example applies to glaucoma, to adenoids, to some forms of calculi, and to many kinds of heart disease. Here Art must come to the aid of Nature.

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## II.—THE BREAKING OF THE CIRCLE BY TREATMENT (fig. X.)

The breaking of individual Circles by the *Ars Medica* is too large a subject for discussion here. Nor is such detail necessary, since a thorough grasp of principles will render easy their application to particular circumstances. All that can be attempted is to indicate some special considerations which influence treatment, where disease is complicated by a Circle.

**Locus Minoris Resistentiæ.** An accurate diagnosis of all the inter-acting forces is important, since the *locus minoris resistentiæ* can then be selected for attack. The treatment of one of the factors will often break the Circle and cure the patient.

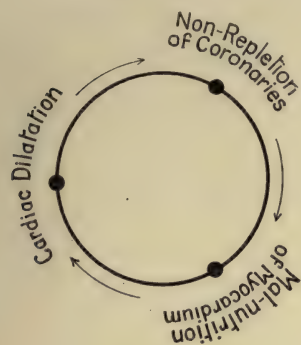
**Hæmoptysis.** As an example we may select "one of the most highly Vicious Circles in pathology,"<sup>1</sup> viz. that in which pulmonary hæmorrhage, cough, rise of blood-pressure and renewed hæmorrhage act and react on each other,—“a Circle which is largely responsible for the profuseness and prolongation of the hæmorrhage.” One practitioner breaks the Circle by using nitrite of amyl, which is frequently successful in arresting hæmorrhage by lowering the blood-pressure. Another prefers to stop the cough by the use of morphia. In either case what appeared to be the *locus minoris resistentiæ* is attacked, and either form of treatment may be successful.

**Treatment of Several Factors.** At other times it is desirable actively to treat *each* of the several factors concerned.

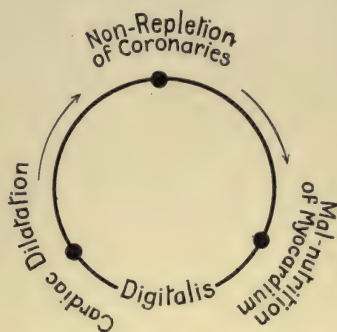
**Pneumonia.** In pneumonia, for example, the practitioner who merely watches the lungs, and is oblivious of the more important cardiac signs, loses the best chance of helping his patient to weather the storm. As important is it to keep the finger on the pulse as the stethoscope on the chest. Again, if in the rush of the out-patient room the unsound heart of a coal-heaver is stimulated with digitalis and strychnine, while no steps are taken to lessen the daily toil that is hindering Nature's efforts at compensation, the remaining span of life will be but brief.

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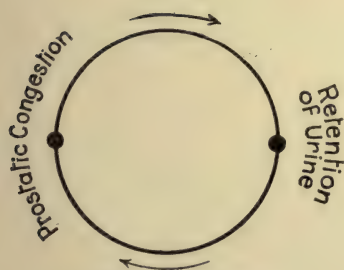
<sup>1</sup> Hare, Food Factor in Disease, Vol. II., p. 97.



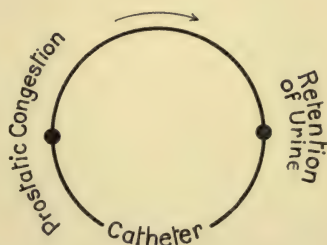
Heart Failure



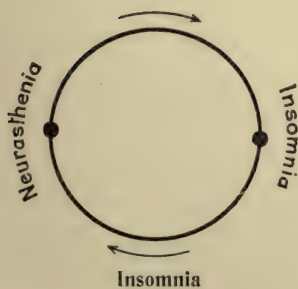
Digitalis



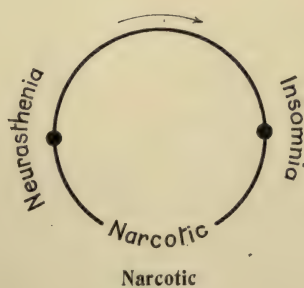
Prostatic Retention



Catheter



Insomnia



Narcotic

Fig. X. The Breaking of a Circle by Treatment.

**Uterine Disorders.** Robin and Dalché point out the importance of treating each of the factors concerned in many gynæcological disorders, viz. the constitutional as well as the local disorder :

“ Les altérations de l'estomac évoluent souvent en même temps qu'une lésion de l'utérus ; les deux affections marchent parallèlement, elles retentissent l'une sur l'autre ; c'est un Cercle Vicieux, et vous aurez beau curetter la cavité de la matrice, et traiter la métrite par tous les moyens ; si vous bornez là votre thérapeutique, vous échouerez ou vous n'obtiendrez qu'un succès temporaire.”

**Surgical Relief.** The surgeon can often give speedy relief by the passage of a catheter, by the removal of a calculus, by an iridectomy, by the reduction of a hernia, and in other ways that need not be enumerated.

It is sometimes sufficient to start the improvement, and leave Nature to do the rest. For instance a pleuritic effusion may be stationary owing to the lymphatic pump, which should get rid of the accumulated fluid, having ceased to work. Removal of even a small quantity of fluid by paracentesis may suffice to re-start the pump, which will soon clear the water-logged ship.

In ascites again where the pressure of fluid checks diuresis and this in turn leads to greater accumulation, removal of even a portion of fluid may be of great benefit. The kidneys and renal blood-vessels are relieved and renal efficiency is restored.

**Use of Drugs.** Drugs may be useful in interrupting a Circle.



Dyspeptic disorders are frequently associated with malnutrition of the nerve centres which in turn aggravates the dyspepsia. In such cases a vegetable bitter such as *nux vomica* may break the Circle by acting on both factors. On the one hand the drug improves the appetite, increases the gastric juice, and diminishes flatulence, thus stimulating nutrition. On the other hand it stimulates the nerve-centres, and as a result the healthy co-operation of the gastric and nervous functions is restored.

Ovarian hyperæsthesia associated with neuroses and insomnia form a combination of disorders which the judicious use of bromides will often correct. By rendering the nervous system less sensitive, the drug prevents the woman from any longer suffering from her congested ovary. Her imaginary fears of illness vanish ; she begins to eat well, to sleep well, to walk well. Her improved health cures her local trouble. The Vicious is replaced by a healthy Circle, and she resumes her household duties, happy and altruistic as before.

In disorders of the heart a Circle is often established owing to a feeble muscular action leading to impaired nutrition of the myocardium, which in its turn further weakens the systole. Here such cardiac stimulants as *digitalis* and *strophanthus* may help in a double way. They first of all stimulate the cardiac muscle ; but at the same time they improve the circulation through, and the nutrition of, the myocardium, and thus further strengthen the cardiac systole. The Vicious Circle is reversed.

**Complete Recovery.** The association of imperfect recovery with a liability to recrudescence alluded to above makes it important that a *restitutio ad integrum* should, whenever possible, be secured, especially under circumstances where such a tendency is known to exist. Treatment should not be abandoned until the nearest approach to complete recovery has been secured.

**Psycho-therapy.** The psychical condition of the patient must be studied, since the mind can influence the body, as well as the body the mind. Ofttimes there is a baseless fear of premature death caused either by imaginary disease, or by some trivial ailment which is magnified into undue importance. Here a few well-chosen words from a trusted counsellor may loose the sufferer from the bonds of despair. Where insomnia aggravates the neurosis, a dose of morphia may render service, acting, in the words of Pridgin Teale, "like a good coxswain, who rallies a crew which had been catching crabs, and makes his men pull together."

At other times psychotherapy will work wonders. Many a miracle at Lourdes, many a cure by faith or suggestion is an example of the breaking of the Circle.

**Removal of Infection.** As regards infective Circles successful treatment depends on the accessibility of the *materies morbi*. Both with oxyurides and with ankylostomiasis transference of the infective

agent to the mouth must by all possible means be prevented.

**Excessive Repose.** In certain diseases such as angina pectoris, neurasthenia or gout, injury is often done by excessive repose increasing the very trouble which the treatment is intended to relieve. It is often no easy problem to decide at what point rest ceases to be beneficial ; only a careful consideration of all the factors involved will guide the practitioner between the Scilla and Charybdis of insufficient and excessive rest.

**Impaired Nutrition.** Impairment of nutrition is one of the commonest factors in a Circle, as has been frequently pointed out. The impairment may be due to disordered digestion, to defective blood-supply (either as regards quality or quantity), or to neuroses. Malnutrition reacts on all these conditions and its correction will require the whole *armamentarium* of therapeutics. Above all is it essential to secure an adequate supply of pure blood.

**Early Treatment.** Lastly it may be pointed out that the alert practitioner, thoroughly familiar with the natural history of disease will endeavour to attack the morbid processes at the earliest possible opportunity. Worthy to be held in everlasting remembrance are the words of Ovid :

*Principiis obsta ; sero medicina paratur,  
Quum mala per longas convaluere moras.*





## Chapter Twelve.



### Conclusion.

Although this Monograph is by no means exhaustive, enough has been said to establish several propositions.

First. Many diseases are liable to be complicated by Vicious Circles.

Secondly. The operation of this complication tends to perpetuate and aggravate morbid processes, and is frequently the cause of a lethal exitus.

Thirdly. The *ἰατρός πολύπειρος* who is fully acquainted with the natural history of disease, and who remembers the well-worn aphorism *melius est prevenire quam preveniri* may often, by intervening at the right moment, prevent the establishment of a Circle. Let him obey another venerable maxim : *venienti occurrere morbo*.

Fourthly. There are many Circles which unaided Nature is able to break, but this she can only do by calling to her aid some extra-ordinary machinery. In other cases Nature's resources must be supplemented by those of Art.

Fifthly. The study of Vicious Circles throws light on many complex correlations, and will unravel many a Gordian knot in obscure disease. Increased accuracy of diagnosis will follow.

Lastly. Inasmuch as *qui bene diagnoscit bene medebitur*, much gain to treatment will result. The physician who cultivates a philosophic insight into the interacting forces, will reap the reward of seeing many a patient *revocare gradum superasque evadere ad auras*.

Lectori amico salutem.



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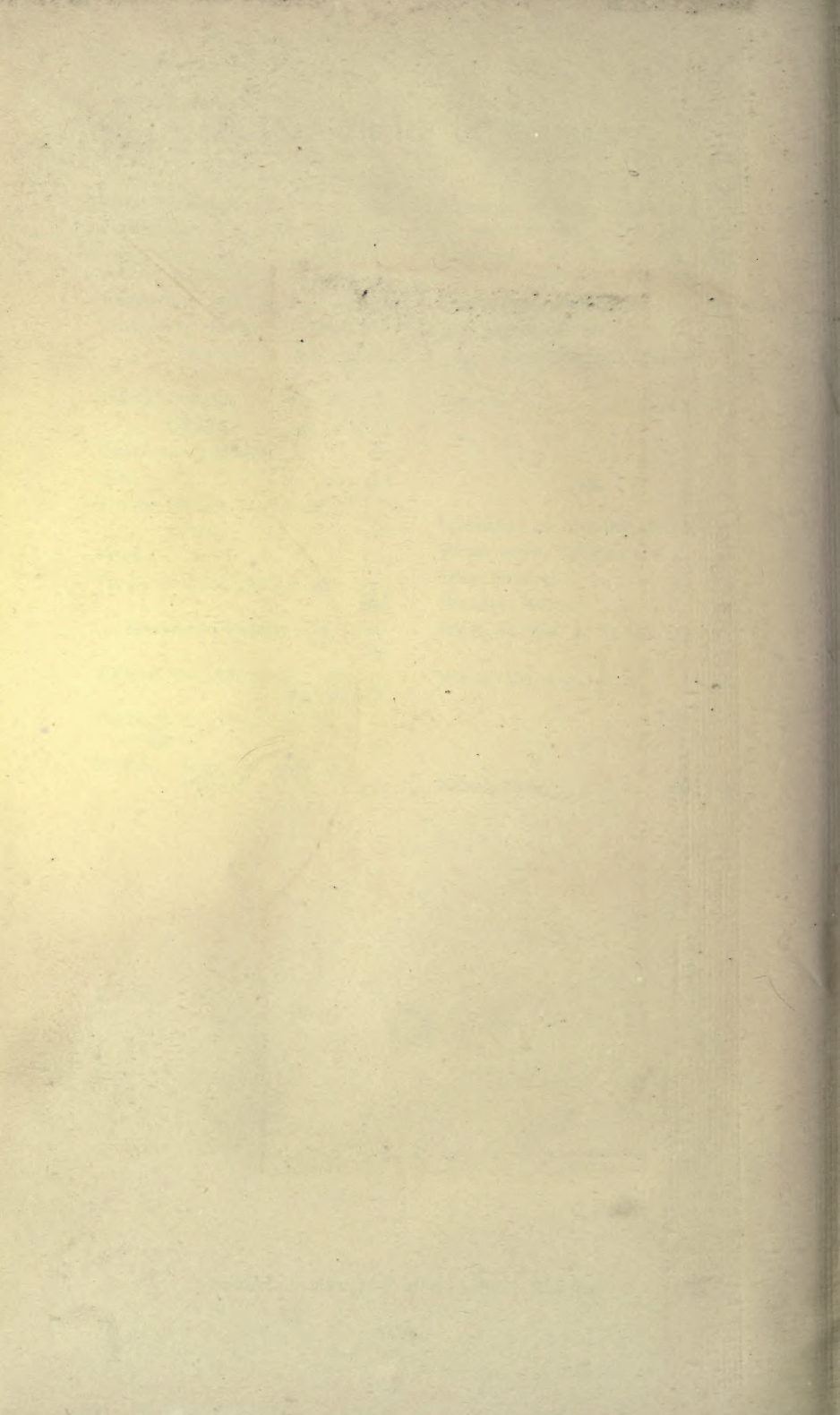


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